



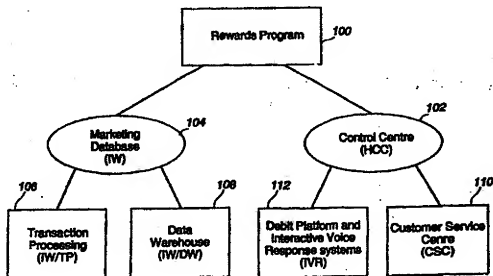
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6: G07F 7/02, G06F 17/60, H04N 17/00		A2	(11) International Publication Number: WO 96/31848
(12) International Filing Date: 5 April 1996 (05.04.96)		(43) International Publication Date: 10 October 1996 (10.10.96)	
(30) Priority Data: 2,142,691 5 April 1995 (05.04.95) CA		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
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Published

Without international search report and to be republished upon receipt of that report.

(54) Title: TELECOMMUNICATIONS REWARD METHOD



(57) Abstract

A telecommunications reward method provides telecommunications services rewards for purchases made by members. The reward method frequently updates the member's reward profiles so that rewards are virtually instantaneous. The rewards consist of telecommunications services, for example long-distance call minutes or cellular telephone air time, and are easily redeemed. Apparatus for implementing the method includes a high-level control centre and a database management system.

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TELECOMMUNICATIONS REWARD METHOD

Field Of The Invention

5 The present invention relates to telecommunications reward methods and is particularly concerned with the rewards based on consumer purchases.

Background Of The Invention

10 The use of loyalty rewards programs to retain existing customers and to entice new ones to purchase or use a particular product has become persuasive amongst retailers from grocery chains to petroleum companies and also amongst credit card companies who provide a reward of some sort or another for using their card rather than a different credit card. One of the problems with these reward programs whether it is air miles for gasoline purchases or credits toward an automobile purchase for using a particular credit card, is that they do
15 not provide something which has immediate value to the participant in the rewards program.

Summary Of The Invention

20 An object of the present invention is to provide an improved telecommunications reward method.

In accordance with an aspect of the present invention there is provided a method of providing telecommunications rewards to a member comprising the steps of generating a point-of-sale transaction, relating the point-of-sale transaction to a member of telecommunications awards, determining value of reward in dependence upon the point-of-sale transaction, updating a member's profile for the member by the
25 value determined.

Accordingly the method of the present invention combines known

technologies in such a way as to create a system whereby participants in a rewards program can be given telecommunications access time, e.g. long distance time, Internet access time or cellular telephone air time, in return for purchases and the reward would be credited and available for use immediately following the purchases.

The method relates a purchase to an immediate reward for telecommunications access time by identifying the purchase as eligible for a reward through a member database for example a UPC code scanner database or a credit card magnetic strip database which then communicates to a telecommunications debit platform which in turn is interfaced with a long distance or cellular provider.

Advantages of the present invention are as follows:

- Providing a link to purchases with instant gratification of telecommunications credits, for example in telephony long distance or cellular minutes and in data communications access time to services or the Internet.
- There is thus no need to save up or receive a statement prior to using the credit, a participant in the rewards program would be able to utilize the reward immediately following the purchase for which the reward was granted.

Brief Description Of Drawings

The present invention will be further understood from the following description with references to the drawings in which:

Figure 1 illustrates, in a flow chart, an overview of the reward method in accordance with an embodiment of the present invention for a magnetic strip card user;

Figure 2 illustrates, in a flow chart, an overview of the reward method, in accordance with an embodiment of the present invention an overview of the method for a UPC code card holder;

Figure 3 illustrates, in a flow chart, the reward method in

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accordance with the embodiment of the present invention;

Figure 4 illustrates in a block diagram apparatus used by the method of Figure 3;

5 Figure 5 illustrates, in a flow chart, an overview processing data flow for the reward method of Fig. 3;

Figure 6 illustrates, in a block diagram, input activities of the method of Fig. 3;

Figure 7 illustrates, in a block diagram, reward transfers;

10 Figure 8 illustrates, in a flow chart, the file processing data flow for the reward method of Fig. 3;

Figure 9 illustrates, in a flow chart, member lead processing data flow for the reward method of Fig. 3;

Figure 10 illustrates, in a flow chart, member enrollment processing data flow for the reward method of Fig. 3;

15 Figure 11 illustrates, in a flow chart, the reward transaction process for the reward method of Fig. 3;

Figure 12 illustrates, in a flow chart, transaction processing data flow for the reward method of Fig. 3;

20 Figure 13 illustrates in a block diagram outbound activities for apparatus used by the method of Figure 3; and

Figure 14 illustrates, in a flow chart, statement processing data flow for the reward method of Fig. 3.

25 Referring to Figure 1 there is illustrated in a flow chart an overview of the method in accordance with an embodiment of the present invention.

At step 1, as represented by a card 10, a point-of-sale transaction is initiated.

30 Step 2, a member card is swiped through a magnetic strip reader, as represented by a block 12, as in a typical point-of-sale transaction.

Step 3, a credit card (or debit) card database is accessed, as

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represented by a block 14, to confirm the transaction. Thus far the method proceeds as is well known with point-of-sale transactions.

5 Step 4, a field in the card holder record, in the database 14, identifies the card holder as a member of the reward plan. Responsive to the presence of this identification a datalink is established, as represented by block 16, to an appropriate debit platform, steps 5a and 5b, as represented by blocks 18 and 20. For simplicity, only long distance 18 and cellular 20 debit platforms are illustrated. However, the actual debit platform used could be a telecommunications services platform. The telecommunications services platform could credit the member with long distance or cellular time or a host of other services, such as Internet access time, voice messaging, call waiting, and calling number identification. Individual member profiles could be used to distribute rewards between the various services or to other users. For example to a daughter away at University.

10 The rewards method is completed by step 6, by the member using the telecommunications reward, as represented by block 2.

15 Similarly Figure 2 illustrates an overview of the method for a member having a UPC type card at step 1, as represented by a UPC card 24.

20 At step 2, a member's card is held to a UPC code scanner, as represented by block 26, as is typical in a point-of-sale UPC transaction.

 At step 3, a UPC code card database is accessed, as represented by a block 28 to confirm the transaction.

25 At step 4, a field in the current holder record in the database 28 identifies the cardholder as a member of the award plan. Responsive to the presence of this identification a data link is established as represented by block 16. The remaining steps in the method are the same as in Figure 1.

30 Referring to Figure 3 there is illustrated in a flow chart a reward method in accordance with another embodiment of the present

invention.

The method begins at step 1 with a point-of-sale transaction being collected, as represented by block 30. Step 2, transactions are aggregated and sorted as represented by block 32. An associated transaction file, as represented by block 34 is created by the first and second steps. At step 3, transactions are rated to determine number of seconds to be rewarded, as represented by a block 36. In order to accomplish this rating, a rewards rating table, as represented by block 38, is consulted. At step 4, any special treatment required for members is determined and rewards are calculated. Special treatment is determined by consulting a member profile, as represented by block 42, and a rewards file is created as a result of step 4, as represented by block 44. At step 5, the member's profile is examined and rewards are updated on the member file, as represented by block 46. The updated member profile is represented by a block 48. At step 6, a master update process is performed on a debit platform as represented by block 50. A debit system member profile is updated as represented by block 52. The method is completed at step 7, when a member phones into the system and consumes rewarded time as represented by a block 54.

Referring to Fig. 4, there is illustrated a reward system 100 comprising a high-level control centre (HCC) 102 and an information works (IW) 104. The IW 104 includes a transaction processor (IW/TP) 106 for partner management, member management, and reward system calculations and an data warehouse (IW/DW) 108. The HCC 102 includes a Customer Service Centre (CSC) system 110 and a debit platform with interactive voice response (IVR) 112.

The method is a database-driven relationship marketing program, there are four distinct business components.

Transaction Processing (IW/TP) Database Management System 106;
Data Warehouse (IW/DW) Database Management System 108; High-level Control Centre for Debit Platform 102; and IVR systems (IVR)

112.

Now to address the system functionality as well as describe the inter-relationship of the Customer Service Centre, Debit Platform and IVR components with InfoWorks' components: Transaction Processing and Data Warehouse Database Management Systems.

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Referring to Figure 5, there is illustrated, in a flow chart, an overview processing data flow for the reward method of Fig. 3. Advantages of the present system are:

- * Immediate gratification with "real-time" reward accumulation and redemption.

- * Conceptually unique, technology-based coalition loyalty program.

- * High appeal, easily attainable reward currency.

- * Preemptive opportunity to link land-based long distance with cellular mobility.

15

- * Debit Platform offers enhanced customer telecommunications services.

- * Opportunity for value-added credit card overlay with innovative functional enhancements.

- * Commitment to data driven Customer Value Enhancement strategies for partners.

20

- * Network time, Debit Platform, and marketing databases supported by blue chip providers.

- * Longer term opportunity exists for Members and Partners to ride the information highway into direct-to-home entertainment/information services

- * Global expansion opportunities with significant ROI.

Overview of Reward Process

* Members in the program earn their points

automatically through electronic Point of Sale (POS) tracking when they shop at participating Partner.

- 5 The IW/TP System collects and processes the Member purchase transactions and assigns the appropriate reward points.

10 The reward redemption process includes calling the IVR system via a 1-800 telephone number, 24 hours a day, 7 days a week: Members will call a 1-800 number, Enter their unique Member Number and password, Place a call with a telephone number of their choice

The HCC/Debit Platform is the data manager of the redemption process and is the vehicle that Members use to redeem their reward points.

15 HCC/IVR platform is a voice-assisted telephony system. The IVR system is a vehicle for: Customer Service, Program Information, Member Enrollment, Customized advertising, Branded messaging, Branded marketing surveys.

For service, Members may access a live operator at the CSC (Customer Service Centre).

Database Management Systems

20 Data Warehouse and Transaction Processing Database Management Systems allow for an extremely flexible environment supporting several basic, but different business functions. Together, they support:

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- Integration with a first class customer service system
- High volume transaction processing
- Detailed management reporting and EIS systems
- Partner reporting
- 5 • Basic analytics and the IW Customer Value Scorecard™
- Marketing information retrieval and advanced analytics

Objectives of the Database Management Systems

- 10 • Design and support a system that is driven by the anticipated marketing information requirements, with the flexibility to adapt to changing market dynamics.
- Ensure seamless connectivity between the Database Systems, Customer Service Centre, Debit Platform, IVR and external suppliers and vendors.
- 15 • Ensure data integrity by developing appropriate edits, controls, audits and procedures.
- Meet the growth requirements of the program in terms of membership, partnership, and more detailed transactional data, i.e. product categories or SKU.
- 20 • Ensure the system architecture has the necessary through-put and offers flexibility, scalability and portability to manipulate and report information in the database.
- Continuously enrich the Member Profile information through survey data, file overlays and tracking of response data.
- 25

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- Deliver dynamic analytic services to support Customer Value Enhancement (CVE) marketing strategies.
- The development of the functional design, system specifications, programming, simulation, training and implementation of the system will take place as two deliverables.

5

IW/TP System Architecture-Pipeline and parallel processing

- The architecture of the IW/TP engine will include many asynchronous processes to handle different stages of transaction processing. The processes will be similar for each transaction type; they will be kept simple; and they will support pipeline and parallel processing. This architecture allows many processes to be reused for different transaction types. Communication processes can be common to many transaction types and for many parties. Separate processes to handle the communication links, to load transaction files into the database; and to process the transactions within the database will simplify the maintenance of the programs. Simple changes to file formats and support for new communication methods could be implemented without touching the transaction processing processes. The migration from a batch engine to a real-time engine could be done quickly by providing a new loader process on top of the existing processing processes.

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Inbound Processes

The processes (or software modules) for an Inbound transaction will be:

- * File reception (from communication line or media),
- * Basic file validation (number of trans.; transaction formats),
- * File segmentation (broken into "work" units),
- * Segment loading (in a work area),
- * Segment validation and computations (still in a work area).
 - Detect and log validation errors
 - Compute any necessary quantity (Rewards, Offers)
- * Segment insertion (into final database)

25

30

Referring to Figure 5, there is illustrated, in a flow chart, processing data

- 10 -

flow for the system. And in Figure 6, there is illustrated, in a block diagram, input activities of the system.

Outbound processes

The processes (or software modules) for an outbound transaction will be:

- 5 * Create outbound transactions (select a set for transmission).
- * Create outbound file (for outbound transactions)
- * File transmission (to communication line or media)

Transaction Types and Input Activities

- * Member Lead (prospect data)
- 10 * Member Enrollment (basic Member data)
- * Member Profile changes (demographics)
- * Member Purchases (POS transactions sent by Partners to IW/TP)
- * Reward Credits (Member Base Offer and Special Offer
- 15 points)
- * Reward Debits (Debit Platform redemption of points ad call detail data)
- * Reward transfers
- * Member IVR Message control (what messages to play)
- 20 * Member IVR Response (responses to branded messages and surveys)
- * Customer Service Messages (problems and resolutions about Members)
- * Fulfillment Request message (control for Member
- 25 fulfillment)

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- * Mail-Out Message Flags (Fulfillment)
- * Database Synchronization (shared table additions/updates)
- * Transaction Acknowledgment (processing audit control).

5

Member Lead (ML)

A prospect may enroll into the reward system program using one of the various methods that are available:

10

- Customer Service Centre
- IVR
- Mail-in order form via Data Entry
- Internet *
- Electronic Kiosk *
- Partner "auto-enrollment" information
- Partner "auto-prospect" information

15

Regardless of which enrollment method is chosen, a new Member Lead transaction is generated and sent to IW/TP.

20

The transaction layout is the same as the Member Enrollment (ME), except the transaction identifier is "ML" and the Member Number must be blank. A unique reference number is assigned to the transactions and stored in the MEMBER_LEAD table. CSC is responsible for returning a clean Member Enrollment (ME) transaction with the assigned reference number. This reference number will be used to update the MEMBER_LEAD table as accepted or rejected. If the lead is rejected, a reason code will be provided by CSC.

25

Referring to Figure 10 there is illustrated, in a flow chart, member enrollment processing data flow for the reward method of Fig. 3.

Rewards Module

- 5 Partners Rewards- Partners are responsible for capturing the reward system data and sending it to FTC. Members (using the reward system card) will earn points for each dollar spent at a Partner's location. Members will have options on "what" currency types they wish to use when redeeming their points, i.e. Long Distance minutes, Cellular minutes, etc.

Data Capture

- 10 There are several methods in which a reward system transaction can be captured and sent to the Partner Host. The methods are as follows:
- * POS Direct - data is captured via card swipe at the Partner POS.
 - * F.I Terminal - data is captured on a Financial Institution Terminal (Credit/Debit).
- 15 * reward system Terminal - data is captured on a standalone reward system terminal.
- * Record of Charge - data is captured on checks/paper.
 - * PC Direct - data is entered and captured on a PC.

Reward Credit Transaction Process

- 20 Once the transaction is received at the Partner Host, the following process is executed:

The Partner then generates a Member Purchase (MP) transaction and sends it to the IW/TP. Procedures and Standards for Data Capture will be provided by FTC to the Partner.

- 25 IW/TP receives and validates the MP transaction by Member Number, Partner ID, Partner's store location ID, offer codes. Any errors are flagged and reported to the Partner.

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Reward points are likely to be pre-calculated by the Partner. However, IW/TP must verify the points in any case. Using the Offer rate table, the reward points are calculated.

5 The reward points are analyzed for fraud by comparing the points to pre-defined Partner thresholds. Any suspected transactions are flagged as "suspense" and FTC is notified for manual verification.

IW/TP generates a Member Reward Credit (RC) transactions. IW/TP will also manage Member and Partner point accumulator buckets.

10 The RC transactions are transmitted to HCC. The RC transactions are stored. HCC receives the RC transactions and updates the available points for the Member on the Debit Platform

The CSC will receive the Reward Credit Transactions via HCC from IW. Reward Transaction Triggers

15 All of these triggers represent a Reward Credit transaction type. Each has its own set of business rules:

Members purchase at a Partner's store

Purchase of a specific item (bonus offer) Purchase of a specific offer of double or triple the BASE

Accumulation of points over a pre-defined time period

20 Transfer from one Member Number to another Member Number (account)

Discretionary award from Customer Service Representative

IVR rewards for completing surveys

Promotional reward of units

Reward Redemption

25 HCC is responsible for managing the Debit Process. This debit process, commonly known as redemption is initiated when a Member consumes or uses a part of their reward points. IW manages the Member purchases to reward "points" conversion process. HCC manages the reward point to "currency" conversion process based on the method of redemption, i.e. Long distance, 30 cellular, video, Internet.

Reward Debit Transaction Process

When the Member redeems his/her points, HCC debits their point balance based on the type of currency used to redeem the points, i.e. 1 cellular minute = 2000 points. A Reward Debit transaction is generated and transmitted to IW/TP to keep the systems synchronized.

Reward Credit Processing

Rules and standards apply for Credit processing. The rules and standards must be authorized by reward system and will vary depending upon the Partner. IW and the CSC can generate credits for a Member (upon investigation). If IW initiates the credit, a Member Reward Credit transaction is created and transmitted to HCC. If the CSC initiates the credit, a Member Reward Credit transaction is created and transmitted to IW. The Member's account will be credited instantly, allowing immediate redemption. Referring to Figure 11 there is illustrated, in a flow chart, the reward transaction process for the reward method of Fig. 3. Referring to Figure 12 illustrates, in a flow chart, transaction processing data flow for the reward method of Fig. 3.

DATA WAREHOUSE

Analytical Processing will render the mass of Transaction, IVR and Customer Service data intelligible and actionable to these reward system stakeholders:

- Partner Marketing Team
- reward system Account Managers
- reward system Program Management
- InfoWorks System Administrator

On-Line Analytical Processing (OLAP) is a system for storing, analyzing, reporting and viewing information about the activity of reward system

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Members. OLAP is distinguished from the TP (Transaction Processor) in these ways:

Storage- Transactions are stored for years, not for only 3 months;

Database- Tables are optimized for fast, flexible data access;

5 Processing- Specialized functions for marketing analytics

The OLAP System has these major components: IW Data Warehouse (DW) for storage and de-normalized tables for accumulating Member transaction data (detail level data), archiving system for low-cost storage and rapid retrieval of old detail data.

10 IW Analytical Processing (AP) for marketing-statistical software procedures for reporting and segmenting.

Partner Report Repository for file storage and access method for historical reports.

15 Partner Marketing Databases (MDB) subsets of data warehouse designed for marketer access at Partner level.

Graphical User Interface (GUI) to provide 'slice & dice' views of the MDB for the FT Account Manager and to provide OLAP system control for the InfoWorks System Administrator.

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Processing Flow includes the steps of:

Validate Input, Running Totals, Upload Format, TP Unit, Procedures.

Data Warehouse

Data Collection from IW/TP

- 5 The TP will act as a central point of data collection for these reward system data sources:

Member transactions from the Partners : Partner transmissions

Reward accounting by the TP : IW TP Center

Debit Platform and IVR activity : HCSC activity

- 10 High-level Control Center

Data Entry

Transferring Data from Data Warehouse to IW/TP

- 15 After download to the Data Warehouse, some analytical procedures will generate Member data values which may be of use in these TP functional areas:

Member Reward Status input variable in logic for bonus rate calculation based on Member segment status i.e. Gold, Silver, Bronze

Members IVR custom messaging flow through to IVR

Mail-out messaging flow thru to statement fulfillment house

- 20 The Analytical Member data will be processed as a special transaction sent to the TP on a WEEKLY basis, taking place after that week's download has been analyzed.

- 25 The InfoWorks' Data Warehouse (IW/DW) stores reward system data to support the reporting, viewing and analytics functions. The DW has three sub-components:

- Physical Storage Units (ex: DASD drives)
- Database System (ex: Sybase)

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- Database Server (ex: Sun 1000)*
- Archive System (tape or optical jukebox)

Referring to Figure 13 there is illustrated in a block diagram outbound activities for apparatus used by the method of Figure 3

5 Referring to Figure 14 there is illustrated, in a flow chart, statement processing data flow for the reward method of Fig. 3.

Debit Card Platform

10 The reward system PCS system comprises a front end voice application that has its own unique call flow as well as a back end database component that will suit the data requirements of the reward system.

The Control Centre 102 is the interface to the debit platform 112. It has access to tables in the reward system PCS database and is able to perform reward system and batch updates. The reward system PCS system requires access to the HCC 102 tables in order to provide some of the features required by the reward system.

15 The main functions and features required for the reward system PCS debit platform 112 are described in the following pages.

The reward system PCS has its own separate master database.

20 The tables that are the main concern are the CARD_NUMBER, CONSUMER_CALL_LOG, and CONS_OUTBOUND_LOG tables.

It is also more efficient to keep the reward system call detail records separate because large call volumes are expected and reward system will be using the call detail records for queries by the Customer Service Centre and for its own analytics. Call detail records are currently stored in the PCS node databases but will need to be written to the central master database so that

they are accessible to the reward system from one centralized location.

5 The reward system member will choose their preferred IVR language during enrollment. This choice will be validated against the choices available on the IVR and will be stored in a language field on the reward system PCS CARD_NUMBER table and in an IVR language field on their member profile. A member's household language is also recorded on their member profile so that analytics can be performed to determine the best options for future languages in the IVR.

10 At launch, English and French are the two languages that need to be available on the debit platform. More language options will be required as the campaign progresses and will be incorporated by simply recording all voice prompts in the new language and making a minor system change to the reward system front end voice application to recognize and act on the new language code.

15 When a member calls into the PCS system, they will be played a "welcome" message and a "request for member number" message in all IVR languages. Experienced members will know to immediately key in their member number rather than listen to the entire voice prompts. Once the member has entered their member number the call will proceed in their
20 chosen IVR language. All voice within the call flow will be played in the member's language including branded messages and surveys.

25 In an alternative of the reward system PCS, a function will be available within the IVR to allow the caller to change their language choice (this will be particularly useful as new languages are added to the IVR). This "change language" function will be a sub-option under the administrative options on the main menu. If a member chooses to change their language in the IVR their current call must continue in the new language and the change must be immediately reflected on the reward system PCS CARD_NUMBER table. Also, a member transaction to the CC must be created to update their member

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profile. Until this function is implemented, the member can change their IVR language through the Customer Service Centre.

Each reward system member number (card number in PCS) will have a password associated with it. This password will be chosen by the member when they first use the debit platform. It is personal to the member and will not be visible to anyone.

A flag may be added to the CAMPAIGN table to indicate whether a campaign uses passwords. As well, a field has been added to the CARD_NUMBER table to store the password for the card. The password length is currently set at 4 characters. A change will be made to increase the length of the password field to 10 characters and allow the IVR to accept a variable length password (minimum 4 to maximum 10 characters). A password reset flag will also be added to the CARD_NUMBER table so that the member can be prompted to choose a new password on their next call.

When the member is initially setup in the PCS system their password will be blank and the password reset flag will be set to Y to indicate that a password needs to be chosen. When the member first calls into the IVR they will be prompted to initialize their password. The member must enter a password which is then validated (4 to 10 characters). The member is then asked to re-enter their password for verification. If the two passwords are identical, the member's password is set otherwise they must begin the entire routine again. On subsequent calls, the member will be asked to enter their password immediately after entering their member number (the member number is validated first).

A function will be available within the IVR system to allow the caller to change their password. This will be a sub-option under the administrative options on the main menu. If a member forgets their password, a procedure will be in place that will allow a Customer Service Centre agent to reset it (this will be an audited process).

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During the call flow, the member will be presented with a main menu of IVR options. The entire menu will be soft prompted such that the caller can make their selection at anytime while the menu is played.

The primary categories on this main menu will be:

- 5 ⇒ To listen to messages, participate in surveys, and earn reward system units, press 1
- ⇒ To place a call, press 2
- ⇒ For administrative options, press 3
- ⇒ For program and/or partner information, press 4
- 10 ⇒ To speak with a reward system customer service centre agent, press 0

Additional menu options can be added as required with the recommendation that the zero out to the CSC option always be played last.

- 15 A sub-menu will exist under the messages/surveys option and will be presented to the caller when they press 1. The primary categories on this menu will be:

- ⇒ To listen to messages from reward system Partners, press 1
- ⇒ To participate in surveys or games, press 2
- ⇒ To return to the main menu, press *
- 20 ⇒ To speak with a reward system customer service centre agent, press 0

The place a call option will lead the caller through entering the telephone number for their outbound call.

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A sub-menu will exist under the administrative option and will be presented to the caller when they press 3. The primary categories on this menu will be:

- ⇒ To change your password, press 1
- 5 ⇒ To query your account balance, press 2
- ⇒ To transfer units to another member, press 3
- ⇒ To change your language choice, press 4
- ⇒ To return to the main menu, press *
- ⇒ To speak with a reward system customer service centre agent, press
- 10 0

A sub-menu may also exist for the program and/or partner information option but will be designed as needed. This may include topics such as "to hear a list of reward system Partners", "to learn more about the reward system program", etc.

- 15 The caller will be guided within the call flow to enter the digits for their outbound call if they have enough units in their account for a one minute call at the lowest rating level (eg. local call). The caller will be able to place a national or international call provided that they have at least enough units remaining in their account (after rating) for a one minute call.

- 20 Outbound calls to regions within the North American Dialing Plan will be rated based on their npa and nxx in conjunction with the npa and nxx of the caller. International calls will be rated on the country code that was entered.

- 25 With only 1 minute remaining in the call, the caller will be prompted with a warning message which states that there is only 1 minute remaining for

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the call. A second warning, with only 10 seconds left, will also play. After their time has been used, the caller will hear a "Your time is up" message and will be disconnected from their outbound call. The caller may also disconnect from their outbound call by pressing the # key. The caller's account will be immediately updated to reflect the time used. The duration of the call will be rounded up to the next minute and this time amount will be translated to units based on the rating scheme for the call. After placing a call (either successfully or unsuccessfully), the caller will hear their new balance and will be presented with the main menu.

10 An outbound call that consumes a member's units will also create a consumption transaction to the CC platform for audit purposes and to update the member's balance on their member profile.

The member will be able to obtain their current account balance within the IVR. A member's account balance is played to them before the main menu is presented.

15 If a member earns additional reward system units by participating in a survey, listening to a special branded message, or playing an interactive game then their updated balance may be spoken to them to assure them that they have received their reward.

20 After a member has entered the digits for their outbound call, the IVR will speak their account balance in terms of how many minutes they have available for the call they have just placed. This balance of time will be calculated based on the rate of unit consumption for that call and will be rounded down to the nearest minute. For example, if they have 6 units remaining in their account but are placing a call that has a 3 units : 1 minute rating ratio, then this rated balance will read "You have up to 2 minutes for this call". If a member's rated balance does not allow for at least a one minute call, they will not be played their balance but will instead be told that they do not have sufficient units to place the call.

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After a member has ended an outbound call, they will be played their new account balance and returned to the main menu.

Branded messages will be offered at two points within the IVR call flow. Type A messages are typically short messages (5 - 10s) and are slotted to play after the member has entered their member number and password. Type B messages are typically longer messages (5 - 30s) and will be available under option 1 on the main menu ("To listen to messages, participate in surveys, and earn reward system units, press 1"). Type A messages can be recycled and played with Type B messages so that a member has the opportunity to listen to them again. After the member has entered their member number and password, the IVR system will check the CC MEMBER_MESSAGE table to determine whether the member has any Type A branded messages that should be played at this time (complete or expired messages are not considered). The next message to be played for a member is based on which one has the highest priority and is the oldest within that priority level. A message code is returned from the MEMBER_MESSAGE table which must then be translated to a voice segment. The message code is looked up in the CC BRANDED_MESSAGE table to determine which voice segment to play, the type of play (hard or soft), and whether there is a reward for fully listening to the message. The message is then played to the caller.

If the caller presses a DTMF key before the end of a soft play message (but after 2s of play) then a message transaction record is created with the message code, the member number, the length of time the member listened to the message, and a "partially listened" status. If the caller fully listens to the message then a message transaction record is created with a "fully listened" status. If the message was fully listened to and a reward is offered, the member's account must be immediately updated to reflect the reward and a reward transaction must be created and sent to the CC for audit purposes. If the caller pressed zero before the branded message finished playing they will be transferred to the CSC (any other key will not have an action associated

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with it). The member's account balance is played after the branded message. It must reflect any additional reward that was given for listening to the branded message. The member will hear a maximum of 1 branded message per call. If the branded message is flagged as recyclable, then the message's
5 priority for that member is lowered so that it will be considered again but only after other messages have been considered. If it not recyclable, then the message for that member will be flagged as complete.

If the caller chooses option 1 on the main menu and then selects to
10 listen to branded messages, they will be presented with all Type A and Type B branded messages. The branded messages will be ordered based on priority and age. If the message is soft play, the member will have the option to interrupt by pressing a DTMF key which will stop the message from playing. The caller will be instructed that the # key is to be used to interrupt/skip a
15 message. With this interrupt, or when the message had finished playing, the caller will be presented with three options. They can listen to the message again, move on to the next message, or return to the menu. After a message has been listened to (either fully or partially) a message transaction record will be created. If there is a reward for "fully listened to" messages, then the member's account is updated with the reward and a reward transaction is
20 initiated. If the message is flagged as recyclable then the priority of the message is lowered so that it moves further down in the queue otherwise, the message is flagged as complete and will not be offered to the member again.

Surveys and interactive games will be offered through option
25 1 on the main menu ("To listen to messages, participate in surveys, and earn extra reward system units, press 1").

If the caller selects option 1 from the main menu and then selects to participate in surveys and games, the IVR system will check the CC_MEMBER_SURVEY table to determine whether the member has any surveys or interactive games to present at this

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time. The member will be able to participate in all surveys or games that have been assigned to their member number. The order in which these surveys are to be presented for a member is based on which survey has the highest priority and is the oldest within that priority level. The survey codes are returned from the
5 MEMBER_SURVEY table and must then be translated to a state table name for each survey. The survey code is looked up in the CC SURVEY table to determine which state table to invoke and whether there is a reward for completing the survey. By branching
10 to a state table, this survey and game feature is very flexible and can involve anything that is possible within the IVR world.

The beginning steps of a survey or game will include a brief explanation of what it is about. For example, "Partner X will reward you with 5 reward system units to answer the following
15 survey". The introduction will also give the caller an option to continue or skip. If the caller chooses to skip the survey or game they simply move on to the next survey that was assigned to them. If the caller continues and partially completes the survey or game then a decision is made within the survey or game whether it
20 should be made available to the caller again (either to complete or to redo). A decision will also be made within the survey about creating a survey transaction record for partially completed surveys. If the caller fully completes the survey then a survey transaction record is created and the survey for that member is
25 either marked as completed or it is recycled by lowering the priority. If the survey was fully completed and a reward is offered, the member's account must be immediately updated to reflect the

reward and a reward transaction must be created and sent to CC for audit purposes. The actual results of a survey or game will be transmitted (if necessary) via the CC to the transaction processing kernel for analytics. This transmission of results will not be a
5 standard transaction as the data produced by a survey or game will vary depending on the survey or game.

Wherever a menu selection is offered in the IVR system, an option on this menu will be to zero out to the customer service centre ("To speak with a reward system customer service centre
10 agent, press 0"). Most of the voice prompts that are played to the caller are soft play and can therefore be interrupted at any time by a DTMF key. If a menu follows one of these prompts then a caller pressing zero during the prompt will transfer their call to the CSC. For example, the member is listening to their account balance and
15 presses zero. This zero interrupts the playing of the account balance and is interpreted the same as the caller waiting for the main menu to play and then pressing zero. The member can also zero out to the CSC while listening to a soft play branded message.

There will also be a tunable option (turn it on or off) that
20 will automatically zero out a caller to the customer service centre when they appear to be having difficulty using the IVR system. For example, the caller was given two tries to enter their member number but the IVR did not detect a response. The caller will be told they are being transferred a CSC agent and can choose to
25 either stay on the line or hang up. The CSC agent can then assist

the caller in determining their difficulty (rotary phone, insufficient time, etc). The caller could also be transferred to the CSC if they appeared to be deliberately trying to defraud the system (eg. member number hunting or guessing passwords).

5 Alternatively, a transfer to the customer service centre could be accompanied by a screen pop based on member number information and perhaps based on where the caller was in the IVR when they pressed zero. The CSC agent will then be able to better assist the caller as they would already have an idea why the caller
10 was transferred to the CSC.

 Once in the IVR system (member number and password have been entered), the caller should be able to transfer units from their account to any other valid member's account in the reward system PCS. This option will be available on the administrative options
15 sub-menu.

 When the caller chooses the member to member transfer option, they will be asked to enter the number of units they wish to transfer. Once the system has validated that the caller did not enter an amount greater than their account balance, the caller will be
20 asked to enter the member number to which they wish to transfer the units. The system will then verify that the "transfer to" member number is valid. The caller will not be asked for the other member's password. The "transfer to" member number and the number of units to transfer will be repeated to the caller. The
25 caller will be given the option to continue (if the information is correct) or restart (if the information is not correct). A member to

member transfer will immediately update the two members account balances. A consumption transaction will be created for the "transfer from" member and sent to the CC for audit purposes and to decrement the member's balance in their member profile. A reward transaction will be created for the "transfer to" member and sent to the CC for audit purposes and to increment the member's balance in their member profile. Note: the alternative option being considered is to send a special member to member transfer transaction to the CC for audit purposes.

Another alternative is to support cellular debit calling. As a result of the mobile nature of the caller, issues such as location of the caller (roaming or out of home area) must be considered. The caller dials something like *99 to connect them to the reward system debit application through which they will enter their member number and password and place their call. The rating (unit consumption) for a cellular call may be different than for a land based call and may also involve a long distance debit. The member will only have one account of units from which either land based or cellular calls are debited.

The IVR system may be able to expand to include other options without significantly changing the current options - so as to avoid confusion for the caller that has become experienced at using the system. Other functions may include: faxing of account information (may consume units); information services (eg. sports, horoscopes) that may consume units per use; etc.

2.0 Customer Service Centre

The Control Centre will be the interface to the reward system Customer Service Centre. All information that is required for the CSC screen will be derived from the CC databases and the debit platform databases.

- 5 The Customer Service Centre will have a screen based application to gather and access reward system data. The CSC agent's screen is populated with member profile data as the call is being transferred (provided that the caller zeroed out from the application after entering their member number).

- 10 The following pages contain details on the main areas of functionality for the CSC application.

Program Information

- Explain the loyalty program

- 15 Explain to members and non-members the reward system concept, who the partners are, how to enroll, how to gather and use units, the rating schemes of the different partners, etc. This information may either be stored online or in a manual at each agent's workstation.

- Create fulfillment requests for members

Generate a fulfillment request in the reward system to initiate a mailout of information.

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- Explain branded messages and surveys

Give assistance about listening to branded messages, answering surveys, or playing interactive games that are currently setup in the system.

Member Profile

5

- Enroll new members into the program

Agents will be able to collect all pertinent enrollment information from the caller into their reward system CSC application. The application will guide them as to the required information and will allow a completed application to be submitted to the CC for processing. The enrollee will receive their reward system card in the mail once the system has processed their application (they will not know their member number until they receive their card).

10

- Correct enrollments

A feature on the CSC application will be to bring forward any enrollments that did not pass the validation process (eg. incomplete data that would prevent the enrollee from being properly serviced by reward system). The CSC agent will place outbound calls, fill in the missing details, and submit the enrollment for processing (the enrollment must contain a valid phone number).

15

- Query member profile

Query with member number to retrieve member profile information (eg. name, address). Queries using other fields will also be required (eg. by name). This function will be used to personalize the conversation between the

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CSC agent and the member as well as to inform the agent of special considerations (eg. hearing impaired, gold rated reward system member).

- Update member profile

5 A query will be initiated to retrieve the member profile information so the CSC agent can verify that the caller is the member. The CSC agent can then change any of the displayed information (eg. name, address, language). Note that a change to a member's spoken language will be reflected on the debit platform.

- Retire or reactivate members

10 Based on a request to do so by a member, the agent will be able to initiate a transaction to the CC to retire or reactivate a member.

- Maintain a contact log

15 All calls between CSC agents and members will generate a contact log record so that member's comments/complaints/suggestions can be collected and recorded as part of their profile information.

- Gather member details/statistics

20 The CSC agents may be able to gather remarks about a member that would be useful in future dealings with that member (eg. hearing impaired, preferred calling time frame for accepting calls, etc.). Also, the CSC agent may ask the member to answer survey questions either on the inbound call or by making outbound calls.

Member Card

- Initiate a password reset

5 Once the CSC agent has verified that the caller is the member, the agent can initiate a password reset transaction to the CC. This transaction sets the member's password reset flag on the debit platform which will then force them to enter and verify a new password the next time they call into the IVR. The ability to do this may be restricted to CSC supervisors as the member will be required to give their personal validation number (eg. mother's maiden name).

- 10 • Handle a lost card problem

A procedure needs to be developed to handle this - the details of the procedure will drive the system requirements.

15 The options are a) to try to determine the member's number so that a replacement card can be mailed to them or b) to re-enroll the member as if they had just joined. With option A, a fulfillment request will be initiated to the CC to send the replacement card. With option B, a new enrollment transaction will be sent to the CC, the member will lose their units and reward system will lose any previous data that had been collected on the member.

- 20 • Create a fulfillment request for additional cards with the same member number.

- Unlock a member's card

A member's card is locked by the PCS system while it is in use. It

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may remain locked if there was a significant system problem while the member was using their card. This unlock process will first verify that the card is not locked because it is currently in use, then it will send a request to the CC to unlock the card. The unlock will be immediately effective.

5 • Add units to a member's card

At the CSC agent's discretion, units may be added to a member's card to compensate for a problem. These units can be charged to different sources (such as a specific partner). This function will initiate a transaction to the CC to immediately update the member's balance and create a
10 MEMBER_REWARD_TXN as an audit.

Member Account Information

• Query account information

Query with member number to retrieve the member's card balance and a history of debits and credits to their account.

15 A member's unit accumulation history consists of reward transactions that show how the member acquired their units and from which source (purchases at partners, CSC agents, branded messages, surveys, other members). If the reward is a summary reward (eg. it is composed of several purchase transactions from a partner) then it will be highlighted and the CSC
20 agent may perform a drill down operation to further define how that summary reward was calculated.

A member's unit consumption history consists of consumption

transactions that show how the member used their units (outbound calls, transfers to another member). Outbound calls will show the number that was called, the duration of the call, and the number of units that was consumed by the call. Transfers will show the member number of the person that the units were transferred to.

Note: This information should be at the same level of detail as the information displayed on member statements (3 months).

CC Transaction Processing

The CC Transaction Processing centre interfaces to the reward system PCS system (debit platform), the reward system Customer Service Centre, the Transaction Processing centre, and the IVR Enrollment process. Transactions are received from and sent to these interfaces either in a batch or reward system mode. The CC TP centre houses transaction databases that are used for audit purposes and well as for queries from the CSC and the reward system PCS.

There will be a suite of applications that will handle member enrollment. The system design to handle these will depend on the method of enrollment. For example, an electronic kiosk may require a direct link to the member profile database and may simulate real-time enrollment. An IVR application can capture DTMF and voice input to create an enrollment record. If enrollments are collected from the customer service centre then screens will need to be designed so that the customer service centre agents may enter the member information directly into the system. If enrollments are gained through amalgamating with already existing loyalty programs then a download

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file from the new partner's loyalty program may be the best solution (however, file format and data transfer issues will need to be resolved).

5 Member transactions with a type "enrollment" will be sent from various sources in either batch or reward system to the High-level Control Centre for validation and processing.

- Collect enrollment data

10 Regardless of the method used to collect the enrollment data from the prospective members, the result will be a transaction to the CC (either batch or reward system). The format of this transaction (MEMBER_TXN) is outlined in the reward system Database Design document.

- Validate enrollment records

15 As enrollment transactions are received, they are validated and recorded in the MEMBER_TXN table as either *new* (passed validation) or *corrections pending* (did not pass validation). CSC agents will be able to modify transactions that are flagged as *corrections pending* and resubmit them for processing. Any enrollments that originate from the CSC, new or corrected, will have been validated online so that they do not recycle continuously through the system causing frustration to both the CSC agent and the enrollee.

20

- Assign member numbers

A process will periodically search the MEMBER_TXN table for validated enrollments. A member number will be chosen from the pool of unique member numbers and will be assigned to the enrollment to complete a new member profile. The member number will be flagged as *in use* in the

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MEMBER_NUMBERS table and the new member profile record will be added to the MEMBER_PROFILE table.

- Activate the new member

5 After the MEMBER_PROFILE record has been created for the new member, the member will be activated on the debit platform by adding their member number to the reward system PCS CARD_NUMBER table.

- Forward member profile to the online analytical processing system

10 A batch process will be run at least daily to send the new member profiles, with member number, to the transaction processing kernel. The transaction processing kernel will add them to their member profile table and issue a welcome kit to the new member. The welcome kit will contain the member's reward system card with their member number printed on the card.

Member Number Maintenance

- Generate new member numbers

15 As the pool of available member numbers declines, new member numbers will be generated and added to the pool (MEMBER_NUMBERS table). The generation process will take into consideration all currently existing member numbers and will not create duplicates.

- Manage the member numbers

20 When member numbers are assigned to new enrollments they are

flagged as *in use*. They remain in this state until the member retires (or is suspended). When a member retires, the member number is removed from the debit platform (member deactivated) and it is also flagged as retired in the MEMBER_NUMBERS table. If the member does not reactivate within a specified period of time then the member number is made available for reuse. Reward system will have to determine a policy with regard to whether a member loses their accumulated units by retiring.

- Database synchronization

A process will be run periodically to verify that the debit platform CARD_NUMBER table remains in sync with the CC MEMBER_PROFILE table. All member numbers on the debit platform must relate to non-retired and non-suspended member numbers in the member profile table and must have the same account balance.

The CC MEMBER_PROFILE table must contain member numbers that match member numbers in the MEMBER_NUMBERS table. The status of the member numbers must also be similar, that is an *in use* number in one table cannot relate to a retired number in the other. Numbers that are not *in use* or *retired* in the MEMBER_NUMBERS table must not exist in the MEMBER_PROFILE table.

The CC member profile table must also be verified with the online analytical processing system member number table to ensure that these two are identical.

Member Profile Information

Note: The full member profile database to be used for analytics will be designed, developed and managed by transaction processing kernel but a subset of this database will need to reside in the CC so that member profile information is available to the customer service centre agents. The information collected in the CC will pertain to information that is required during the enrollment process; information that can be changed by the member calling the CSC; and information that can be changed via an IVR function (eg. language). All data contained in the CC tables of the member profile database will be created, updated, and deleted by the CC. That is, the CC has the master version of these tables. A copy of new, updated, or deleted records will be sent to the transaction processing kernel so that the corresponding tables in their member profile database can be maintained.

- Process member profile updates

Member profile updates will be received in reward system or batch from the customer service centre (eg. name, address) or the IVR (eg. language) or transaction processing kernel (eg. from white mail processing). The CC will record these transactions in the MEMBER_TXN table, validate the changes and update its member profile table. It will forward these changes to the transaction processing kernel to update their member profile table and will also update the debit platform if required.

- Process member profile retirements or suspensions

The customer service centre can initiate retirements or suspensions at a member's request or the CC can determine that a member should be retired or suspended based on account inactivity or fraudulent use of the system. The CC will record these transactions in the MEMBER_TXN table. It will forward these updates to the transaction processing kernel to update their member

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profile table. The CC will also apply these changes as deletes to the CARD_NUMBER table in the debit platform database.

- Forward miscellaneous fulfillment requests to the transaction processing kernel

5 Fulfillment requests will be created for welcome kits, replacement cards, program or partner information, and account statements. These requests will come primarily from the CSC.

- Forward any member number based data collection to the online analytical processing system for analysis

10 This type of information will be from survey responses or member comments that were collected in the IVR or by the CSC. A member's demographic information (eg. number of cars) may also be collected via the IVR or CSC. These two types of information will not be stored in the CC member profile table but will be transmitted to the transaction processing
15 kernel to be stored in their data warehouse. The type of information collected may vary so a flexible process needs to be developed to handle this data transfer.

Member Reward Transactions

- Receive member reward transactions from the online analytical
20 processing system

Initially there will be a batch process for transmission of this data. These rewards are derived from member purchases from partner point of sale

5 systems. The reward, with purchase information, is captured in the MEMBER_REWARD_TXN table for audit purposes and for the CSC interface so that an agent can explain to a member how they earned their units. After the transactions are added to the table, they are summarized by member number and the member's balance is updated with the reward on the debit platform CARD_NUMBER table and on the CC member profile table.

- Receive member reward transactions from the Customer Service Centre

10 These rewards are generated when a CSC agent gives a member units because of a problem they experienced. They are sometimes associated to a particular partner if the member's concern relates specifically to a partner. The reward is captured in the MEMBER_REWARD_TXN table with the CSC agent's id for audit purposes and for queries by the CSC. Immediate reward system update to the member's balance on the debit platform
15 CARD_NUMBER table is required. The member's balance on the CC member profile table is also updated.

- Receive member reward transactions from the debit platform

20 Reward transactions will be received from the debit platform for member to member transfers of units, branded messages, and survey completion. These rewards have already been added to the member's balance in the CARD_NUMBER table but need to be added to the member's balance on the member profile table. They also need to be captured in the MEMBER_REWARD_TXN table for audit purposes and for queries by the CSC.

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- Transaction audit trail

The CC system should be able to track all transactions and if necessary re-process any transactions that were not processed successfully. The system should also be able to reverse any transactions that were sent in error (backing out a reward from a member's balance if necessary).

5

- Report any errors/anomalies

As reward transactions are processed, they will be validated and analyzed for errors such as unknown member number or "large" reward, etc. A facility will be provided to review and correct any errors/anomalies and resubmit the reward transaction for processing.

10

- Send member reward transactions to the online analytical processing system

Online analytical processing system will need a copy of reward transactions for rewards that were not generated by purchases (eg. units awarded by the customer service centre or from a survey) so that the information is available for statementing, billing, and analytics. This information will be sent in a batch process.

15

Member Consumption Transactions

- Receive member consumption transactions from the debit platform

20

Member consumption transactions will be generated by the debit platform for outbound calls that consume a member's units. The member's balance on the debit platform CARD_NUMBER table has already been

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updated but the member's balance on the CC member profile table needs to be updated. The consumption information is captured in the MEMBER_CONSUMPTION_TXN table for audit purposes and for the CSC interface so that an agent can explain to a member how they used their units.

- 5 • Receive member consumption transactions for transfers

10 A member to member transfer will generate a reward for one member and a consumption for the other. If this transaction originates from the debit platform then both members' balances on the debit platform have already been updated but the members' balances on the CC member profile table need to be updated. If this transaction originates from the CSC then the members' balances need to be updated on the debit platform CARD_NUMBER table and on the CC member profile table. This transaction will be captured in the MEMBER_CONSUMPTION_TXN table for audit purposes and for queries by the CSC.

- 15 • Send member consumption transactions to the online analytical processing system

A batch process will extract and send the member consumption transactions to the transaction processing kernel so that the information is available for statementing and analytics.

- 20 • Transaction audit trail

The CC system should be able to track all transactions and if necessary re-process any transactions that were not processed successfully. The system should also be able to reverse any transactions that were sent in error (backing out a consumption from a member's balance if necessary).

- Report any errors/anomalies

As consumption transactions are processed, they will be validated and analyzed for errors such as unknown member number or "large" consumption, etc. A facility will be provided to review and correct any errors/anomalies and resubmit the consumption transaction for processing.

Branded Messages

- Forward a list of valid branded message codes to the online analytical processing system

Once a branded message has been recorded and setup on all the IVR nodes and a code has been assigned to uniquely identify the message, it will be sent to transaction processing kernel so that members can be assigned to listen to the message. The information about a branded message is stored in the CC BRANDED_MESSAGE table.

- Accept from online analytical processing system member message assignments

A batch file containing a list of targeted member numbers with a corresponding branded message code and priority will be sent from the transaction processing kernel to the CC. As the CC processes this file, it will add the member number and branded message code combination to the MEMBER_MESSAGE table. There is a need to queue many messages for a member but to only play one per call. The member message table is essentially the member's queue of messages from which the debit platform chooses the next message to be played to the member during their call into the IVR.

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- Funnel member message information back to online analytical processing system

5 When a branded message has been listened to by a member, either partially or fully, a record is created in the message transaction table (MESSAGE_TXN). This table records the date and time that the message was listened to and how much of the message was listened to by the member (number of seconds). A batch process will extract and send member message information to transaction processing kernel for "listened to" messages.

10

- Record and apply rewards (if applicable) for fully listened to messages

- Automatically expire branded messages after a preset date

- Cancel branded messages at any time

Member messages can be cancelled either specifically by member number or globally like the expiry.

15 **Surveys (or Interactive Games)**

- Forward a list of valid survey codes to online analytical processing system

20 Once the survey or interactive game has been developed and setup on all the IVR nodes and a code has been assigned to uniquely identify it, it will be sent to transaction processing kernel so that members can be assigned to

the survey. The information about a survey is stored in the CC SURVEY table. The call flow position field in this table will determine where in the call flow the survey can be offered.

- Accept from online analytical processing system survey assignments

5 A batch file containing a list of targeted member numbers with a corresponding survey code and priority will be sent from transaction processing kernel to the CC. As the CC processes this file, it will add the member number and survey code combination to the MEMBER_SURVEY table. There is a need to queue many surveys for a member but to only play
10 one per call. The member survey table is essentially the member's queue of surveys from which the debit platform chooses the next survey to be played to the member during their call into the IVR.

- Funnel member survey information back to online analytical processing system

15 When a survey has been fully completed by a member a record is created in the survey transaction table (SURVEY_TXN). This table records the date and time that the survey was completed. A batch process will extract and send member survey transaction data to the transaction processing kernel for completed surveys. The survey responses will be sent to the transaction
20 processing kernel through a separate process as this information will vary depending on the design of the survey.

- Record and apply rewards (if applicable) for successfully completed surveys

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- Automatically expire surveys after a preset date

- Cancel surveys at any time

Member surveys can be cancelled either specifically by member number or globally like the expiry.

5 Fraud Detection

- Provide system alarms and procedures to detect and deal with fraudulent card use.

Telecommunications Reporting

- Manage the reward system call detail records on the debit platform

10 If this information is required for analytics, then extract it and send it to the transaction processing kernel. A history will be maintained for billing purposes as well as for telecommunications analytics. The CC will control the archiving of the cdr information from the reward system

15 CONSUMER_CALL_LOG and CONS_OUTBOUND_LOG tables on the debit platform.

- Provide information and reports that can be used to optimize telecommunications

Reports will be available to analyze the system usage and capacity requirements with regards to call volumes and peak periods. These reports

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will be used to optimize all aspects of the telecommunications from 800 number translations through to the Summa and DirectTalk. Telecommunications reporting will also analyze the batch and reward system transaction processing of the CC.

- 5 Numerous modifications, variations, and adaptations may be made to the particular embodiments of the invention described above without departing from the scope of the invention, which is defined in the claims.

CLAIMS:

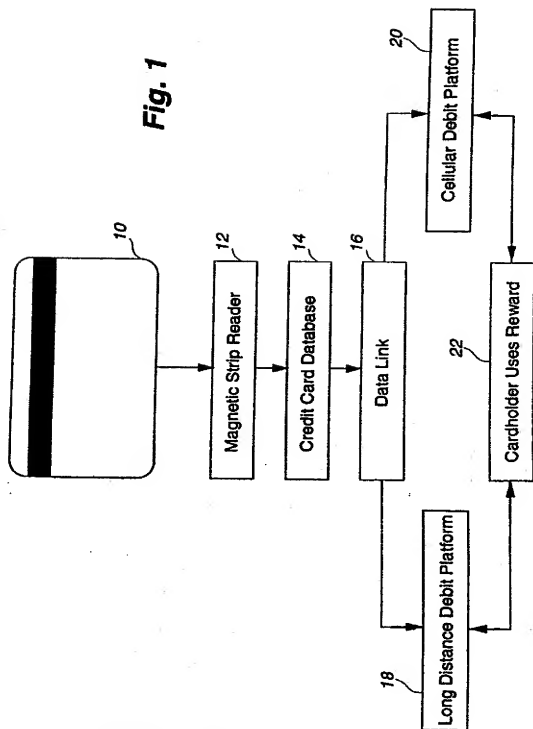
1. A method of providing telecommunications rewards to a member comprising the steps of:
 - generating a point-of-sale transaction;
 - 5 relating the point-of-sale transaction to a member of telecommunications awards;
 - determining value of reward in dependence upon the point-of-sale transaction;
 - updating a member's profile for the member by the value determined.
- 10 2. A method as claimed in claim 1 wherein the step of generating a point-of-sale transaction includes the steps of scanning a UPC code card of the member, and looking up the UPC code in a UPC database.
- 15 3. A method as claimed in claim 1 wherein the step of determining value of the point-of-sale transaction to a member includes the step of referring to the member's profile and a rewards file.
4. A system for providing telecommunications rewards to a member comprising:
 - a data collection system;
 - a customer service centre;
 - 20 enrollment processes;

- 60 -

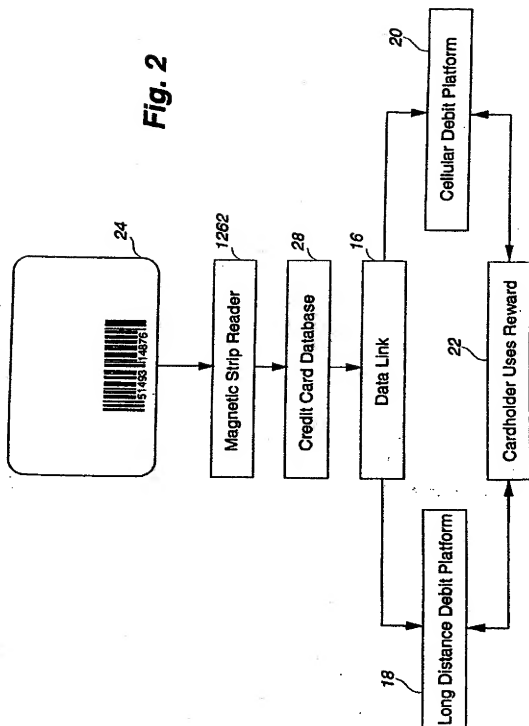
a transaction processing system for managing data from the point-of-sale collection system and members and for calculation of rewards;

a control center for processing system transactions for the customer service center, system access, debit platform management and enrolling processes.

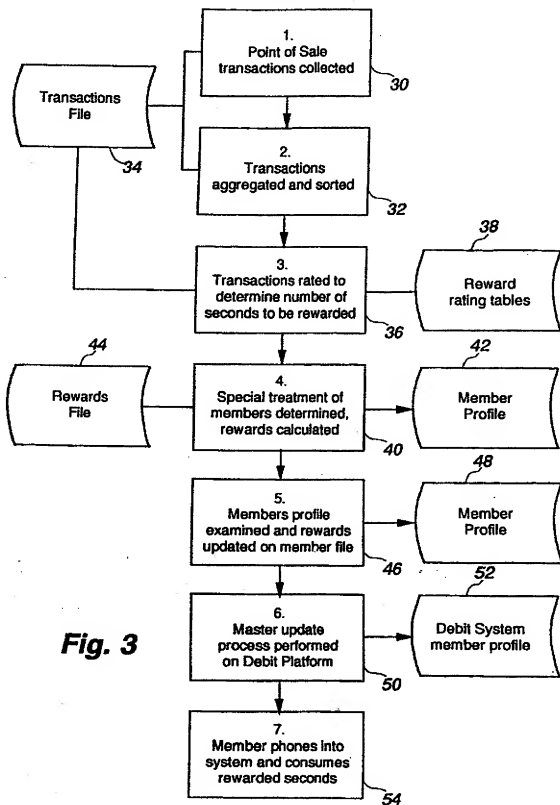
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Fig. 1**SUBSTITUTE SHEET**

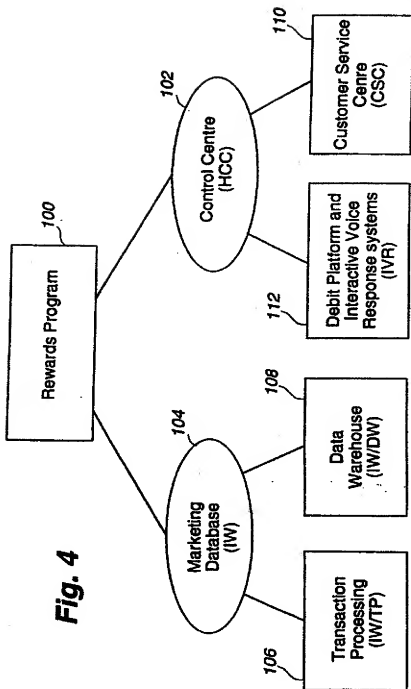
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Fig. 2**SUBSTITUTE SHEET**

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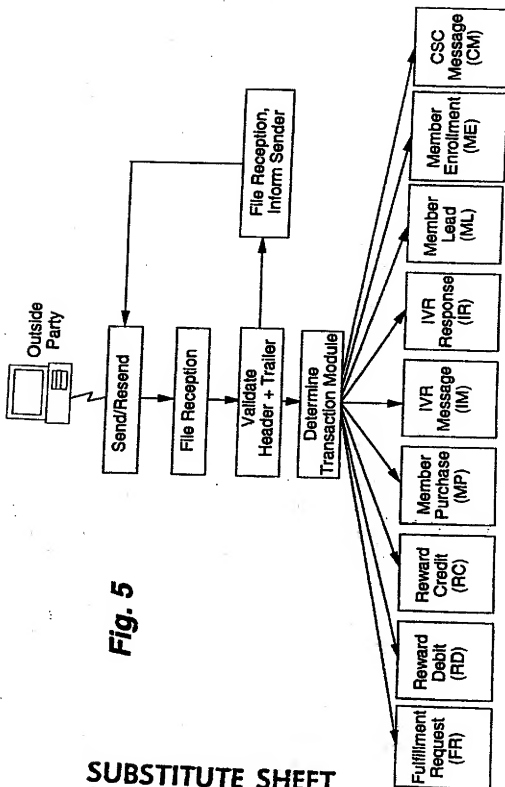
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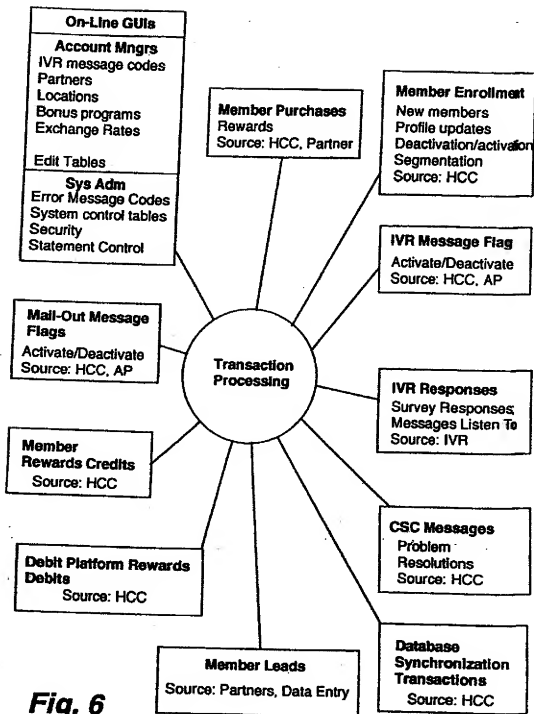
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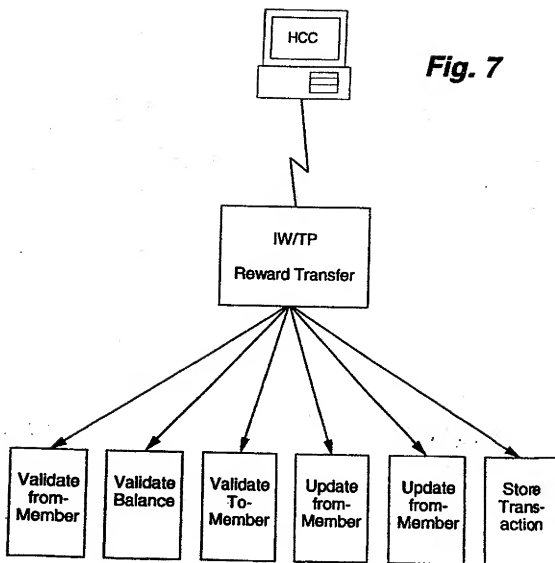
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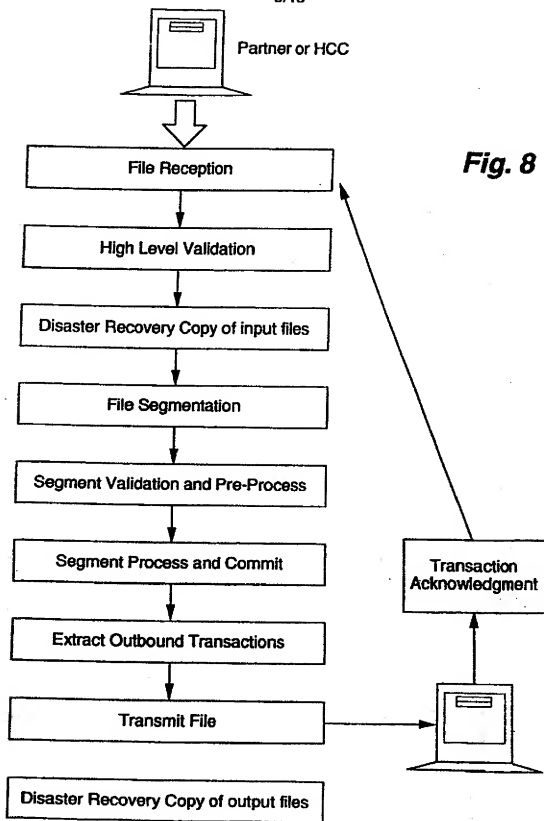
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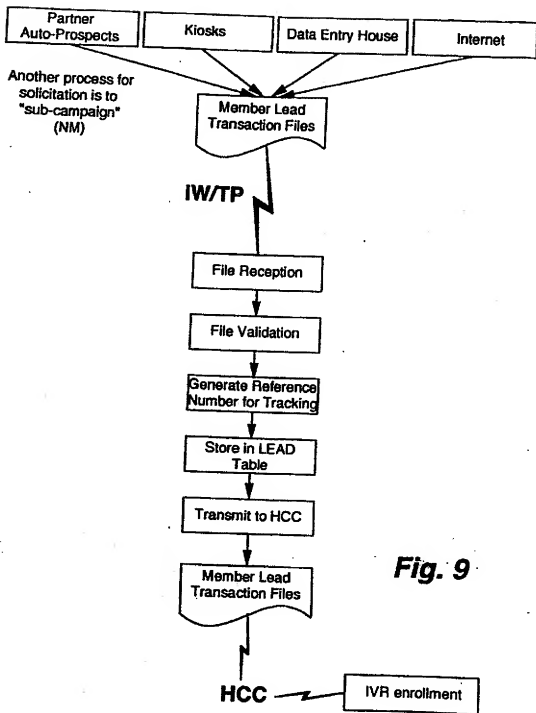


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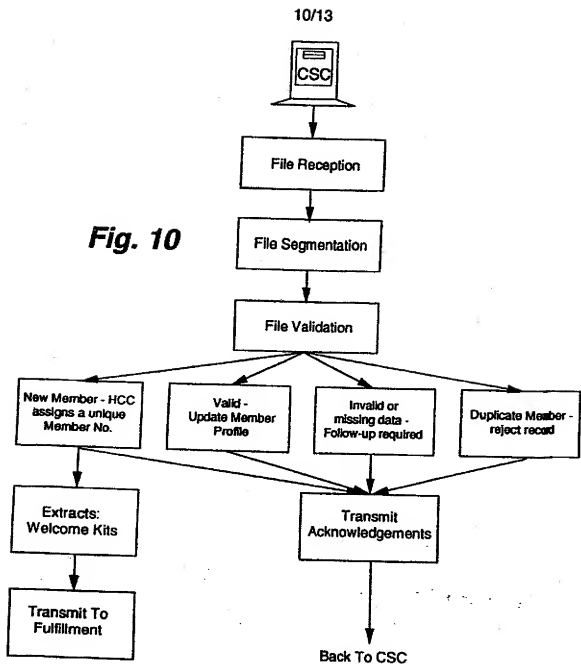
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**Fig. 8****SUBSTITUTE SHEET**

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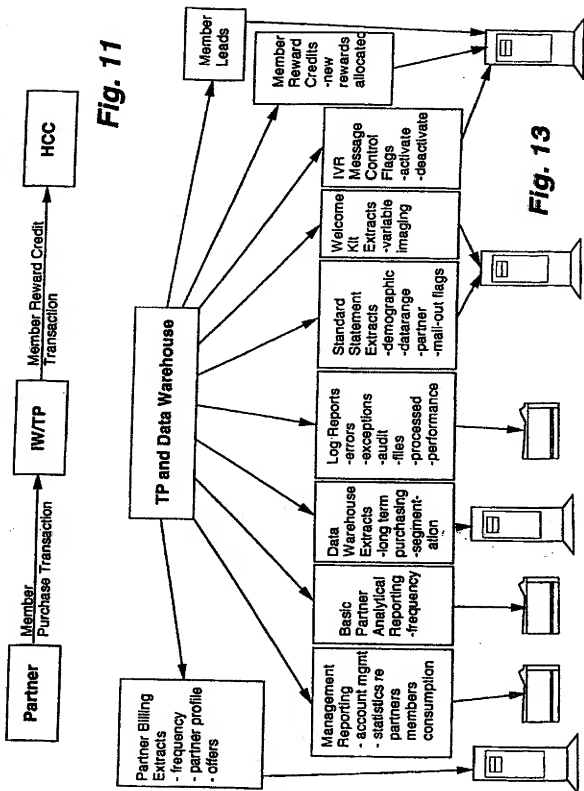
**Fig. 9**

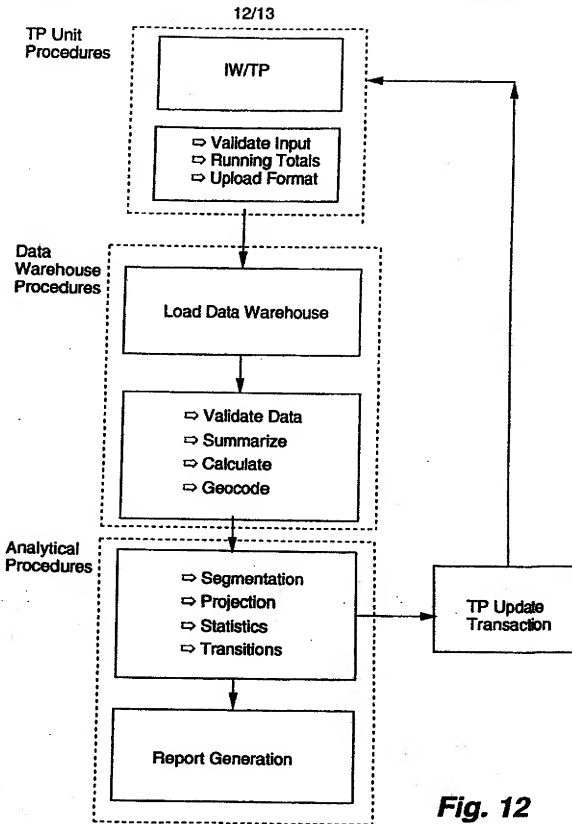
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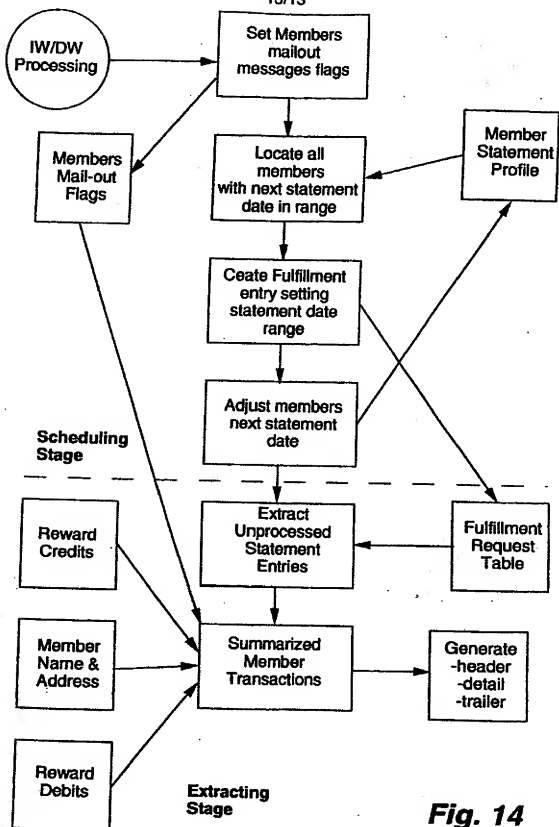
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Fig. 11**SUBSTITUTE SHEET**

**Fig. 12****SUBSTITUTE SHEET**

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**Fig. 14****SUBSTITUTE SHEET**



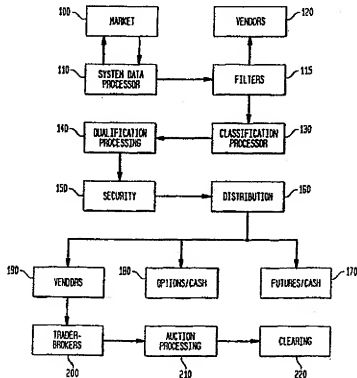
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G06F 17/60		A1	(11) International Publication Number: WO 98/26363
		(43) International Publication Date: 18 June 1998 (18.06.98)	
(21) International Application Number: PCT/US97/22423		(81) Designated States: AL, AU, AZ, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HU, IL, IS, JP, KP, KR, LC, LK, LR, LS, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(22) International Filing Date: 3 December 1997 (03.12.97)		Published With international search report.	
(30) Priority Data: 08/766,733 13 December 1996 (13.12.96) US			
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(54) Title: AUTOMATED AUCTION PROTOCOL PROCESSOR

(57) Abstract

A data processing system for implementing transaction management of auction-based trading for specialized items such as fixed income instruments. The data processing system provides a highly structured trading protocol implemented through a sequence of trading paradigms. Once properly formatted (130) on-line market data (115) is transmitted for determination for a real time command selection (140), then loaded into a security database (160). System proprietors in automated options and futures processing (170 and 180) obtain data for quantifying and evaluating positions pursuant to trading option and futures contracts on individual securities. The distribution for securities data to the data accumulators and vendors (190) is followed by continual distribution of securities data to traders within investment community (200), the support of automated trading (210) and finally declaring and reporting functions associated with such trading including clearance operators (220). The system employs a distributed computer processing network linking together a plurality of commonly programmed controlled workstations. The protocol and its programmed controlling logic enhances trading efficiency, rewards market makers and fairly distributes market opportunity to system users.



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Automated Auction Protocol Processor

Field of the Invention

The present invention relates to data processing systems for assisting in financial transactions. More particularly, the present invention relates to a data processing apparatus and method for the managed trading of select classes of securities or other commodities in accordance with specific protocols in an auction format with controlled sequence of auction events. The inventive system is presented in the context of selected fixed income auction protocols for fairly and quickly transacting offer-bid trading.

Background of the Invention

Economic activity has at its centerpiece the buyer-seller transaction for all goods and services produced and consumed in a market economy. It is the fundamental mechanism to which resources are allocated to producers and output to consumers. The operation of the buyer-seller mechanism can and often is a critical determination of economic efficiency and when operated properly, will substantially enhance market performance.

Through history, there have been many different approaches adopted to fairly bring buyers and sellers together, each with the key objective of permitting transactions at or as close as possible to the "market" price of the goods. By definition, the market price is the price (in given currency terms) that a fully educated market, given full access will transact select goods. This can only be accomplished by permitting full access to the transaction by essentially all potential buyers and sellers. However, the buyer-seller transaction must be structured to operate at very low costs - or it will distort the market price of goods with the artificially high transactions costs. Thus, as can be seen, the two keys to effective buyer/seller transactions - full access and knowledge coupled with low costs - can be and are often conflicting, necessitating trade-offs between trading efficiency and market knowledge.

One well-known and particularly successful trading system is known as the "open outcry auction". This involves a process wherein buyers and sellers collect in one location and prices for select goods are presented to the group through a broker, via simple vocal offerings. This approach has been used for almost all kinds of goods, but is particularly useful where there are no established trading locations or markets for the selected items. It is the dominant trading forum for exotic items such as rare pieces of art and the like. Although successful in bringing interested parties to the transaction, the overall process can be very expensive, adding significantly to the market-distorting transaction costs.

Open outcry auction techniques, modified over time, have also found successful application in many commodity trading activities, including the buying and selling of farm produce and livestock, oil and commodities contracts, future contracts on a variety of items and - particularly germane to the present invention - fixed income securities. These trading activities focus on the buying and selling of essentially fungible items, that is, items that are without meaningful differentiation from like items on the market. For example, a bushel of wheat for February delivery is considered for sale and delivery at a price independent from its source. Similarly, a 30-year treasury bond paying a coupon rate of 6.75 percent and having an August 1996 issue date is indistinguishable from other 30-year treasuries having the same properties. Accordingly, the price buyers are willing to pay and sellers willing to accept defines the market price of all 30-year treasury bonds of that same vintage, allowing a source transparent application of open outcry auction trading.

The fixed income securities issued by the United States Government are known as U.S. treasuries. These instruments typically span maturity terms at issue of 13 to 52 weeks (T-bills), one to ten years (notes), and up to 30 years (bonds). The T-bills are pure discount securities having no coupons. Almost all other treasuries having longer terms are coupon notes or bonds, with a defined payment cycle of semi-annual payments to the holder.

Treasuries have characteristic properties that make them especially useful for the purpose of the present invention and, therefore, are used exclusively in the following discussions with the fundamental tenant that the principles may be applied to other types of fixed income securities without departing from the inventive concepts. One important attribute of treasuries, in the context of the present invention, is the minimal and uniform default risk; the issuance of U.S. government paper removes the default risk as a defining criteria in the relative pricing of treasuries in the market place when they are backed by the full faith and credit of the U.S. government.

New treasury securities are auctioned by the U.S. government at pre-established auction dates. The auction prices for the treasuries having a face value with a set coupon rate will define the issuance yields of the security. After the auction, the treasuries enter the secondary market and are traded typically "over the counter", i.e., without a defined exchange. As inflation expectations and supply and demand conditions change, the prices of the recently auctioned treasuries fluctuate on the secondary market. These new prices are reflected by competing bid and ask prices communicated among institutions, banks, brokers, and dealers in the secondary market. For example, the yield of a treasury note increases as its price drops in the market, typically reflecting an overall increase in the interest rates for that term of security.

The newly auctioned securities are traded with and in conjunction with the securities issued in earlier auctions. In this context, some securities are traded more often than others and are called the "actives"; the actives usually correspond to the recently issued securities as opposed to the older securities in the market. Indeed, some older securities are infrequently traded, creating an illiquid market that may or may not reflect the current market-determined interest rate for that maturity length security.

As can be realized by the foregoing description, the very size and diversity of the treasury market implicates an unprecedented level of sophistication by market participants in the bidding, offering, buying, and selling

transactions involving these securities. The very complexity associated with the transactions and the scale of trading undertaken by banks, brokers, dealers and institutional participants necessitates a rigidly structured approach to trading.

5 In the past, open outcry auction bond brokering has served its customers well, providing highly efficient executions at near perfect market pricing. The open outcry auction applied to bond trading was implemented by a broker working with a collection of customers to create and manage a market. Typical customer representatives - both buyers and sellers - at a common location (e.g., a single room) where the representatives of the customers would
10 communicate with each other to develop pricing and confirm transactions. This process employed the expression by the representatives of various bid and offer prices for the fixed income security at select volumes (i.e., how many million dollars of bonds at a given maturity). This expression would involve the loud oral "cry" of a customer-proposed bid or offer and the coordination with the
15 fellow representatives regarding the extraction of complimentary positions - until a transaction match is made and a deal is done. This "trade capture" process relies on after-the-fact reporting of what just transpired through the oral outcry trade.

20 Recently, the trade capture process was performed by having designated clerks input data into electronic input devices. An input clerk would attempt to interpret the open outcry of many individual brokers simultaneously who sequentially are making verbally known their trading instructions of their customers. The quality of the data capture was a function of the interpretative skill of the input clerk, and the volume and the volatility of customer orders. A
25 significant drawback to this type of auction data capture process is the difficulty in discerning the distinct trading instructions verbalized in rapid succession during a quickly moving market, so that an accurate sequence of data can be captured by brokers and a set of inputters.

30 The many permutations of this process will be discussed in some detail below. At this juncture, suffice to say that at the volumes of business

transactions existing at the time of its development, and the lack of suitable alternatives, left this process as the dominant trading mechanism for decades. However successful, this approach was not perfect. Indeed, in recent years, some of the problems in an open outcry auction forum have been amplified by the vastly increased level of trading now undertaken in the fixed income field. Without attempting to be comprehensive, difficulties would occur by the injection of trader personalities into the open outcry auction process. For example, a loud, highly vocal representative may in fact dominate trading - and transaction flow - even though he/she may only represent a smaller and less critical collection of customers. Although such aggressive actions at open outcry auction may be beneficial to those particular customers in the short run, overall, such dominance of the trading can and will distort pricing away from the actual market conditions.

Other problems exist in open outcry auction that deplete efficient trading. The speed at which trading flows and the oral nature of the auction process injects a potential for human error that often translates into many millions of dollars committed to trades unrelated to customer objectives. As such, the broker is left at the end of each trading day with a reconciliation process that may, under certain market conditions, wipe out all associated profit from that day's trading. Also, customers may quickly change direction regarding trading, based on new information available to the market. Shifting position or backing out of previously committed transactions on very short notice is often very difficult in the traditional open outcry auction process.

There have been many past efforts to incorporate computers into trading support for select applications and securities. Indeed, almost all trading today involves some computer support, from simple information delivery to sophisticated trading systems that automate transactions at select criteria. However, these systems have not significantly impacted the issues presented above as they relate to open outcry auction trading in the fixed income field. It

was with this understanding of the problems with certain trading processes that formed the impetus for the present invention.

Summary of the Invention

5 It is, in view of the foregoing, an object of the present invention to provide a data processing system to implement a trading system capable of high volume trading activity.

Another object of the present invention is to provide a data processing method supporting a transaction enabling process for trading securities at
10 accelerated levels with minimal errors and costs.

It is yet another object of the present invention to provide a data processing system to support a formalized trading protocol governing the control of trading on a bid/offer market.

15 It is also an object of the present invention to provide a system for collecting, displaying and distributing in real time information on current market activity in fixed income securities and processing this information to quantify the extent of order and trading activity of customers in real time.

20 It is another object of the present invention to provide an apparatus for the select processing of several types of data wherein data is qualified prior to use and translating the qualified data into order and trading states for fixed income securities.

It is still another object of the present invention to provide a data processing system that provides controlled access to trading commands pursuant to pre-established trading criteria.

25 It is yet another object of the present invention to provide a computer system that includes multiple workstations linked by a high speed communication loop to permit rapid distribution and exchange of market data to participating customers and brokers.

It is still another object of the present invention to provide a system that rewards customers that create liquidity while insuring customer orders are satisfied in an orderly and equitable fashion.

5 It is yet another object of the present invention to provide a database system linked to the auction processor for collecting, filtering, and distributing select market data in near real time.

10 It is another object of the present invention to provide a computer system with a dedicated input system for a workstation, that is customized for the trading undertaken by that workstation and may be customized to the trading patterns and customers for a given broker at that workstation.

Yet another object of this invention is to provide timely order checkout.

15 Still another object of this invention is to provide customized trading tools particular to a given customer, such as stop limit orders, contingent orders, flags (warnings) to the broker that a particular customer has reached a trading limit (e.g., margin limit), and the like.

20 A further object of this invention is to utilize the present system for the trading of other financial products, such as futures, indices, commodities, securities, other options, and the like; in general, any tangible or intangible property that would be amenable to purchase/sale by open outcry auction.

25 The above and other objects of the present invention are realized in a specifically delineated computer-based, data processing system having a governing program controlled logic for orchestrated management of select trading functionality. The data processing employs a plurality of trading workstations linked with a server for coordinated data flow and processing. Communication is provided by *per se* available network, via Ethernet, token ring, token bus, or other hierarchical LAN and/or WAN configuration. The system preferably includes a dedicated keypad for input from each workstation that facilitates providing individually programmed keystroke commands; other keyboards or keypads can be used and are often software configurable so as to be compliant with the present system. A central processing logic dictates the

30

available trading options and screen displays for each workstation. As transactions are entered, various protocols effect the allocation of bid-offer control and trade management. As trades are completed, the system updates a linked database with the newly entered transactional data.

In accordance with the varying aspects of the present invention, the controlling logic provides for a particular sequence of trading states for each participant. The five states are:

TABLE I

- (i) Workup State
- (ii) Bid-Offer State
- (iii) Second Look State
- (iv) When State
- (v) Workdown State

As the various transactions are entered, the trading stations and their interrelationships exist in one of these five states. The workstation "state" will determine the options available to that trader - and thus enables controlling the flow of trades in a cost-efficient and error-free manner. As all participants implement trading on similarly configured workstations, the protocols are universal for all traders, thereby precluding aggressive control of transactions in the absence of true capital commitment.

The foregoing features of the present invention may be more fully appreciated by review of specific illustrative examples thereof, presented hereinbelow in conjunction with a descriptive set of figures.

Brief Description of the Figures

Fig. 1 is a system block diagram depicting the salient hardware components of the present invention;

Fig. 2 provides a flow diagram depicting the transmission of trading related information;

Fig. 3 depicts the salient features of the dedicated keypad;

Fig. 4 is a block diagram of the various system states and pathways therebetween;

Fig. 5 is a logic diagram for trading data input;

Fig. 6 is a logic diagram for the Bid/Offer State;

Fig. 7 is a logic diagram for the When State;

Fig. 8 is a logic diagram for the Workup State;

Fig. 9 is a logic diagram for the Second Look State;

Fig. 10 is a logic diagram for the Workdown State; and

Fig. 11 is a trading logic summary table.

Detailed Description of Specific Embodiments of the Invention

In brief overview, the present invention is directed to a data processing system for implementing complex trading rules in support of select transactions.

The first aspect of the invention relates to a particular hardware arrangement that provides a specifically tailored platform for processor enhanced and supported trading. This hardware arrangement encompasses a plurality of custom designed workstations linked together for communication. Each workstation is linked to a central server that orchestrates the trading processes in accordance with program controlled logic. The workstation includes a display for presentation of the particulars of trading activity. A customized keypad permits enhanced data/position entry by the broker.

The second aspect of the invention is the governing logic for controlling system dynamics. This logic is stored in system memory and provides the sequence of protocols and rules that allocate trading priority, and the system responses to operative commands entered by the brokers at the workstations. The system logic is critical on two levels. First, it is important as the guiding principles underlying the system and thus performance is tied directly thereto. On a second level, system logic must be known to all customers and traders as the rules dictating market access and response - to eliminate any confusion and

to place participants on as close to an equal footing as possible. It is a fundamental precept of the present system to provide fair and complete access to the trading process to all registered participants.

To better appreciate the details of this invention, a review of the nomenclature employed herein is recommended. For purposes of illustration, the examples given in this application focus on fixed income instruments and trading of these instruments in large volumes - with the volume of a given transaction delineated in dollars (e.g., \$25 million of 10-year treasuries).

The following terms, and their associated definition, are used herein:

TABLE 2

Bid	Dollar amount offered to <u>buy</u> a security - issue.
Offer	Dollar amount offered to <u>sell</u> a security - issue.
Spread	Difference between best bid(s) and offer(s) on market.
Issue	A common class of fixed rate treasuries.
Hit	Accepting a pending bid.
Lift	Accepting a pending offer.
Size	The volume in dollars of a particular Bid/Offer.
Makers	Customers with pending offers and bids - making a market.
Uncleared Entry	Current bids/offers that lack a counterparty, i.e., have not been lifted or hit.
Traders	After a trade is initiated, all customers involved in transactions (as buyer or seller).
Trade	A string of transactions at one price initiated by a hit or lift and continuing until timed out or done.
Aggressor	A customer who initiates a trade.
Active Side	Group of Traders on same side of market as the Aggressor.
Passive Side	Group of customers on opposite side of market from the Aggressor.

The general context of system operation is based on the repetitive operation of several functions, and, in its preferred embodiment, implements these functions through a specially designed keypad. Generally, the process begins when customers contact the brokers and place bids and offers for a defined class of instruments. These various positions are displayed on the computer terminal in specific ways to reflect priority, etc. A customer can establish trading priority by placing a bid or offer at a select price and volume; bids at the same price are displayed on the screen in time order in which they enter the system (as are offers). As such a "queue" of bids and offers develops, with place in line set by time at the same price. This queue is displayed on screen at the broker's workstation. Typically, there is a small difference between the bid price and offer price - the "spread". If no difference exists, this is known as a "locked" market.

Importantly, a bid and offer are commitments - once placed, a bid can be "hit" and an offer can be "lifted" by a customer willing to trade the instrument at the set price.

To control trading between many participating customers, some level of hierarchy is set. A customer who hits on a bid or lifts an offer is promoted to a new level known as the "aggressor". By acting on a bid or offer, the aggressor defines (and thus establishes) the active side of the trade. For example, if the customer hits a bid, selling becomes the active side of the trade and buying turns passive. However, if the customer lifts an offer, buying is active. This is an important practical consideration, as by convention the active side pays commissions on the ensuing transactions. This allocation of commissions is premised on the notion that the active customers are taking advantage of liquidity - while the passive side is supplying liquidity to the market.

For controlled implementation, the above-noted delineation between active and passive sides is important and carries more significance in processing transactions than the different sides of the transaction, i.e., the bid and offer.

Focusing further on the nomenclature for the system logic, a "trade" is considered a sequence of trading events, triggered by the initial hit or lift that defines the aggressor, and continues for all such transactions until the trade "clears". During a trade, the aggressor side remains active and all transactions take place at the price set by the initial hit or lift - regardless of the number of following transactions. To properly track transaction activity, a trade generates a (virtual and/or real) single trade ticket, with an associated, preferably screen-displayed, reference number, and can additionally generate several trade tickets each one reflecting the total size of the transaction per customer per side.

In view of the foregoing, attention is first directed to Fig. 1, a block diagram depicting various hardware components found in an operative embodiment of the present invention. In this context, a plurality of workstations 10 are provided, each individually linked to a central server by network lines 15. Server 20 can be controlled by software for managing the interaction of the individual workstations 10 in accordance with system constraints.

Continuing in Fig. 1, the system may be linked to brokers and customers at remote locations. Access to trading activity is accomplished to Communication Server 30 and Remote Server 40 to a remote distributor hub 50 and remote workstation 60. Supplemental communication lines are utilized via conventional phone link 90. The above platform further includes a 32-bit operating system to manage the multi-tasking environment within the network. The present invention has been successfully implemented using the OS/2® operating system; however, other operating systems may be substituted. The workstation design can be selected from Pentium® processor based PCs, SPARC Station® (using UNIX®) or other microprocessor based systems.

Now turning to Fig. 2, the overall information paths of the present invention are presented in block diagram form. This market information is derived from the auction process and is a highly valuable source of data to related markets (futures and options, or cash, as the case may be). Beginning with block 100, market data is collected from the plurality of on-line terminals

operated by brokers within the relevant bond market sector. A continual exchange of information flows between the brokers, depicted in block 100, and the system proprietor, block 110, i.e., as bids, offers and trades are transacted in real time. This information is collected by the system proprietor and entered into the data processor database.

On-line market data is then transferred to the data filter and enhancer module, block 115, which acts to clarify and articulate the continuous incoming market data for use, e.g., by data accumulators, block 120. One aspect of the data enhancer operation will be the conversion of on-line trading information into digital form for transmission to the classification processor, block 130. The operation of the classification processor is directed to creating a data set in proper format for further manipulation. This includes the generation of a coordinated array of data in matrix format.

Once properly formatted, the on-line market data is then transmitted to the qualification processor, block 140, for determination for a real time command selection. The information is then loaded into the security database, block 150, and then passed to the distribution processor, block 160.

The foregoing operation will result in the real time distribution among brokering stations for decision execution and for select distribution within the fixed income investment community. In the context of the present invention, three segments of this community are provided with the data. At block 180 and block 170, system proprietors involved in automated options and futures processing are provided the securities data for quantifying and evaluating specific options and futures positions pursuant to the trading of option and futures contracts on individual securities. In a similar manner, the securities data is provided to system proprietors regarding options and futures contracts to permit proper transactions in the trading of options and futures contracts based on the individual securities data.

The third channel of distribution for the Securities data is to the data accumulators and vendors at block 190. This is followed by the continual

distribution of the securities data to traders and brokers within the investment community, block 200, the support of automated trading, block 210, and finally declaring and reporting functions associated with such trading, block 220, to include clearance operators among others.

5 The trading activity is highly fluid and fast paced. Accordingly, efficient input systems are important to effectuate the multiple options and the use of a highly specialized keypad that permits these levels of efficiency in the present context. Accordingly, a separate aspect of the present invention is the unique keypad depicted in Fig. 3.

10 During processing, various "states" are reached, depending on the type of inputs received by the system. The core state of "Bid-and-Offer" reflects the open status of the market. In this state, customers are referenced as "makers" and "contra-makers"; during all other states, customers are considered "traders" and "contra-traders". Under this notation, traders and makers are those
15 customers that issue a trading command, while contra - makers and contra - traders are those who receive a trading command. Some participants in the Workup State, *e.g.*, the first buyer and/or first seller, are known as "current workers" and are vested with the authority under system control to hold up a trade for a predetermined duration of time. Important character distinctions
20 between customers at various stages of trade processing are displayed to the broker on screen by reverse highlight or similar attribute.

 The interrelationship of these five system "states" is depicted in Fig. 4. Initial trading is always predicated on the Bid/Offer State, 400, with the sequence process, 420, assessing system inputs for a change of current state. As
25 inputs are entered, a state change is triggered and processing shifts to the paradigms associated with (i) When, (ii) Workup, (iii) Workdown, and (iv) Second Look. As each state is entered, the protocols are shifted and new rules to trading apply.

30 Information about trade progress and participants are provided at each workstation in the form of a specifically oriented screen display. In particular,

the system provides for screen display in the form of a trading quadrant or "quad" wherein key trading indicators are displayed. A sample QUAD is depicted below:

QUAD 1

100.01		2	100.03		15
CUST	Bid	Bot	Cust	Offer	Sold
2001	1	0	2007	5	0
2002	1	0	2006	10	0
TOTL	2	0		15	0

In the above QUAD, the current bid is depicted adjacent and above the CUST designation - reflecting a bid price of "100.01"; continuing on the same line, the current offer price is set at "100.03" - indicating a spread of .02. When a trade is in progress - as initiated by a hit or lift from the Bid/Offer State, the broker's attention is mainly directed to the conditional prompt showing the total size that is being bid or offered and that can be acted upon by the participating customers. This number is displayed at the intersection of the totals line and the Bid/Offer column. This total is further refined in the quad into individual prequantities, indicating the customer sizes in their respective rows.

Above the BOT and SOLD captions in QUAD 1, a second totals counter provides the Makers total to the broker. In the Bid/Offer State this total is the same as the conditional prompt as there are no executions. This changes after the first transaction when a "traders list" is created - and the conditional prompt tracks the traders total, while the Maker's total keeps track of the quantity left in the Maker's list.

Turning now to Fig. 5, the data selected for display on the QUAD is processed in accordance with depicted logic. The system enters a new CUST(ID), block 520, e.g., "2001" and stores this in active memory with

associated trade data/command TRD(ID), block 530. The trading command is confirmed at a systems level, i.e., rejecting system errors via Alarm, at 550. Once confirmed, the new data/command TRD(ID) is distributed to the screen buffers for the associated work status for display, block 560. This is repeated for each new entry, block 570.

The following discussion now focuses on the Bid/Offer State, wherein market makers are inputting various bids and offers into the system while waiting for an execution as the market matures. These pending commitments may be taken via hit or lift by makers currently showing or by a third party without showing its position prior to the hit (or lift). As new bids and offers are made, the price attendant therewith determines the placement in the queue, with equally priced offers (or bids) ordered in time entry. Accordingly, as the market tightens with better bids and offers (reducing the spread), these new positions are moved to the top of the queue as displayed.

In addition to price, bids and offers include a size component, that is used to express the dollar volume of the pending bid (or offer). For a customer to increase the size of the bid or offer, a new entry is made, and placed into the queue separately as the system will not increment the size component - unless adjacent to an existing Bid/Offer already in the queue. In this way, as bids and offers are entered during this state, they are displayed to the brokers in relation to their respective size, with the total Bid/Offer count (aggregate size) displayed at the above noted conditional prompt. As such, the conditional prompt serves as the main impetus for a transaction due to its measure of apparent market capacity at a given price.

A Bid/Offer is typically entered as "uncleared" during the Bid/Offer State, indicating that the bid or offer is only available to the current market participants, i.e., those on the list with current commitments (bids/offers). Accordingly, uncleared presentations are seen on the screens of only these participants for a system set time interval - and only those customers with current participation can lift or hit these uncleared entries. After the preset time

interval has run (tracked by system internal clock) the uncleared bids - if still extant - become available beyond the current participants. There is a business purpose for this arrangement. By allowing customers with active bids/offers the first view of the new entry, this rewards these customers for showing the market on their side. Thus the initially bidders are invited to become Aggressors - and the system preset interval provides these bidders time to make their decision by preventing new buyers and sellers from entering into the market for this discrete interval.

The system logic associated with the Bid/Offer State is depicted in logic flowchart form in Fig. 6. Logic conceptually begins at block 600, with the data/command entry at block 620. The State Selector qualifies the State as Bid/Offer, block 620. At block 630, the CUST_X profile is taken from the new entry and all associated data passed into a parameter string, block 640, which is entered.

Continuing with this logic path, test 650 compares any Bid/Offer pricing associated with TRD(ID) to then pending bids and offers to discern whether the new entry improves on current pricing; if not better, logic branches to block 660 and the new entry is placed at the end of the queue, Q-end. However, if the new pricing, PRL(ID) is better than the old (then current) pricing PRC(OLD), logic brings the new CUST_X to the top of the queue, block 660; also, the market is locked allowing only the current makers (displayed) to react to the new pricing for a pre-set time, block 670.

At test 700, system checks for a new hit/lift; if none, logic continues to the next entry, block 710. A position response to Test 700 shifts processing to the next state, block 720.

The screen display will change according to the various entries into the bidding process. In QUAD 2 depicted below, customers 3001 - 3003 on the bid side reflect a market of 27 million; see conditional prompt: 27. This includes a first bid by customer ("CUST") 3001 of 5.0 million, followed a little later by a second bid of 20 million. In this example, CUST 3007 (could be a bank or

other institutional participation) has entered the picture with an uncleared offer of 10 million (marked by asterisk - indicating offer is uncleared); this is the 10 million depicted on the conditional prompt line on the offer side. As such, controlling logic gives the original makers the first review of the new offer by 3007. After the interval, the market is again opened.

QUAD 2

>7.625 225		TZ				
108.04		27		+108.04		10
Cust	Bid	Bot	Cust	Offer	SOLD	
3001	5	0	3007	10	0	
3002	1	0				
3003	1	0				
3001	20	0				
TOTL	27	0		10	0	

The When State is triggered by a trading command against an uncleared Bid/Offer by an Aggressor who is not one of the original makers. However, the system controls will not allow this trading command by the new Aggressor to be instantaneously executed. In accordance with system logic, the trading processor creates a time interval or delay, and thereby provides the original Maker(s) time to assess the new situation created by the Aggressor by permitting response to the uncleared entry on the passive side.

In particular, as noted above, the uncleared status exists for a defined interval - controlled by computer driven timer. It is only during this interval that a When State can be instituted, which can then only last until resolved by either the action of the original Makers on the passive side, or by the expiration of the interval timer within system logic.

During When State processing, the system displays the original Makers - existing with Bid/Offer outstanding prior to the entry of the new Aggressor - and the new Trader(s) entering via hit or lift commands on the pending uncleared Bid/Offer; these Makers and Traders are clearly separated on the screen. (See QUAD 3B below). Importantly, these original Makers are given

the opportunity to trade at the new price point established by the Aggressor; multiple makers from the original list will each have access to take the new price in the order of their priority in the queue. The system will increment through each Maker; if one issues a buy/sell order at their size, they become the Aggressor. If this occurs, the logic departs the When State and can either enter the Workup State or Workdown State depending on whether the new Aggressor takes the entire volume indicated at the conditional prompt.

Once When State processing has been initiated, no trader entries from the passive side are permitted and customers are blocked from entering on the active side, if they represent the only customer input from the passive side previously. Entries on the uncleared (active) side will come from new traders, extant traders, or the original makers which drive the system back to the Bid/Offer State preceding a trade. If, for example, a trade has 10 offered and 5 are "up", during the When State the trader preferably can cancel the amount which is not yet committed.

However, if the second interval timer expires without any intercession by the original Makers, the When entries (one or several) will automatically trade - and the original Makers will not part take in this trade. During the interval, WTAK flashes on screen to the Makers showing a take on the uncleared offer; WHIT will flash for a hit on an uncleared bid. During this interval, the size entries for pending Makers are all initialized to zero, and no longer presented at the conditional prompt.

When State processing is depicted in Fig. 7 and is triggered by a trading command CMD(I), block 810, Test 820 confirms that the new trading command (hit or lift) is from a new Aggressor; if not, logic continues to block 880 and to either Workup or Workdown State.

However, a positive response to Test 820 branches logic to block 830, wherein the market is locked for a pre-set time interval. At block 840, all then-current makers are reset to zero. At test 850, the system determines if these makers intercept the Aggressor before the time interval expires. If yes, the

intercepting maker becomes the Aggressor, block 860, with full control over the succeeding trade sequence. If not, the new Aggressor is set, block 870, and logic continues to the next State, block 880.

The following sequence reflects the foregoing system logic: In QUAD 3A below, the Bid/Offer State has two customers, 3002 and 3003 each showing bids at 10 million; customer 3007 has just placed an uncleared offer for 1 million. Customer 3001 wishes to lift the new offer by customer 3007 - but he can't automatically. In QUAD 3B below, customer 3001 attempts to lift the offer by customer 3007 forcing the system into the When State, and creates an uncleared list for the active side (bid here). However, the prequantity of the first two bidders is reduced to zero - as the system logic requires that these bids cannot be enforced at the new price point. In this example, the second interval timer provides both original Makers priority over customer 3001; with customer 3002 retaining overall priority via its placement in the queue.

QUAD 3A

>7.625 225		TZ				
108.04		20		+108.04+		1
<u>Cust</u>	<u>Bid</u>	<u>Bot</u>	<u>Cust</u>	<u>Offer</u>	<u>SOLD</u>	
3002	10	0	3007	1	0	
3003	10	0				
TOTL	20	0		1	0	

QUAD 3B

>7.625 225		TZ				
108.04		20		108.04+ WTAK		1
<u>Cust</u>	<u>Bid</u>	<u>BOT</u>	<u>Cust</u>	<u>Offer</u>	<u>SOLD</u>	
3002	0	0	3007	1	0	
3003	0	0				
3001	1	0				
TOTL	1	0		1	0	

Transactions forming a trade take place in accordance with the present invention during one of two trading states, known as the Workup and Workdown States. The Workup state occurs pursuant to hits or lifts by an aggressor taking the entire inventory of volume shown on the passive side; once established, the Workup State gives exclusive rights to the trade to the initial trader - who the system recognizes as the current worker. On screen, current workers are highlighted in a defined manner known to other participants. Current workers control the trade and can submit additional transaction volume to their contra-traders; this to the exclusion of outside customers. Current workers on the active side of the trade will include the Aggressor, and possibly other traders, below the Aggressor with transactions that move the trade into the "Workup" State by filling residual volume that needs "Workdown". For the passive side, an Aggressor that takes the entire size limits current worker status to himself and his counterparty.

The status of current worker dissipates upon entry of "done" by the broker, or the lapsing of the trading inactivity interval. Again, this interval is a pre-set system parameter triggered via system logic. Absent such termination, current workers can trade almost indefinitely, as long as they continue to respond to their corresponding size offerings.

The Workup State logic is depicted in Figure 8 and is principally tied to size and new order data. The Aggressor size is entered as is the passive side prior to trade entry, blocks 910 and 920, respectively. At test 930, the system determines if the Aggressor has taken the entire market offering at time of trade; if "no" to test 930, logic continues to block 990 and ultimately the Workdown State (Figure 9).

A positive response to Test 930 passes logic to blocks 940 and 950 wherein the current workers are assigned and new trades entered. The system tests for new trades, Test 960, and processes these accordingly, block 970. This continues until the current workers are done or timed out, Test 980.

The above logic is better understood in the context of a particular example. As shown in QUAD 4A below, a typical opening Bid/Offer display is presented.

QUAD 4A

>7.625 225		TZ				
108.04		16		108.05+		45
<u>Cust</u>	<u>Bid</u>	<u>BOT</u>	<u>Cust</u>	<u>Offer</u>	<u>SOLD</u>	
3001	5	0	3007	25	0	
3002	5	0	3006	10	0	
3003	1	0	3005	10	0	
3001	5	0				
TOTL	16	0		45	0	

Assume the bid is hit by CUST 3005 selling the entire size (\$16 million) to the passive side. This results in CUST 3005 as the Aggressor and the contra-traders (CUST 3001, 3002 and 3003) as the current workers. It is now the Workup State as the Aggressor has taken all initial size from the passive side. See QUAD 4B.

QUAD 4B

>7.625 225		TZ		Refno 68119		
108.04		16		108.05+		36
<u>Cust</u>	<u>Buy</u>	<u>BOT</u>	<u>Cust</u>	<u>Sell</u>	<u>SOLD</u>	
3001	0	10	3005	0	16	
3002	0	5				
3003	0	1				
TOTL	0	16		0	16	

As a current worker, CUST 3002, wishing to continue, adds an additional 5 million size (adding to CUST 3002's original 5 million), which is displayed as 5 under Buy and 5 under BOT. See QUAD 4C. A new customer, CUST 3004, now offers 50 million.

QUAD 4C

>7.625 225			TZ	Refno 68119	
108.04	HIT	16	108.05+		36
Cust	Buy	BOT	Cust	Sell	SOLD
3001	0	10	3005	0	16
3002	5	5	3004	50	0
3003	0	1			
TOTL	5	16		50	16

New CUST 3004 must wait until the current workers are done (via keyboard entry or timer controlled system interval). Only after this, may CUST 3004 clear the additional 5 million by CUST 3002, while leaving 45 million uncleared (see QUAD 4D).

QUAD 4D

>7.625 225			TZ	Refno 68119	
108.04	HIT	21	108.05+		36
Cust	Buy	BOT	Cust	Sell	SOLD
*3001	0	10	*3005	0	16
3003	0	1	3004	45	5
3002	0	10			
TOTL	0	21		45	21

As can be appreciated, various customer moves in the market are often fast paced - and on occasion position changes may occur almost simultaneously. An example of this may be a first customer hitting a second customer's bid of a certain size, via the buy/sell all key - an instant after that a second customer has significantly increased the bid size - say from \$5 to \$20 million. In this situation, the Aggressor, within the system, has now taken much more than he planned. This situation can be very disturbing in a rapidly shifting market.

System logic addresses this problem by creating a supplemental state known as the "Second Look" State. If during processing, the passive side size

is increased just prior to a hit or lift command, the system discriminates the very recent offer/bid from the earlier entries, via an "age" timer, i.e., a system interval that tracks the pendency of all bids and offers and creates a Second Look State whenever a hit/lift (via buy/sell all key) occurs while a Bid/Offer is under, e.g., two seconds old.

The Second Look, however, is limited. The Aggressor must complete the transaction excluding the new, i.e., "unaged" Bid/Offer. The new size is left uncleared and others may add more offers/bids on this, the passive side - but these stay below the line. Even though the Aggressor did not fill the entire size displayed, the Aggressor assumes current worker status and has the right to:

- 1 Take the new size, creating the Workup State with the contra-traders;
2. Refuse the new size; the Aggressor refusal (via "done" command) sets the trade into the Workdown State; and
3. Take/hit a "partial" amount and then lose priority.

The Second Look State is governed by the logic structure depicted in Fig. 9. In this arrangement, the trading command is entered - time stamped at block 1020. The extant passive maker entries are also entered, block 1030, and Test 1040 determines if the Passive side entries, PASS(ID) are "aged", i.e., not just entered. If yes, logic branches to Test 1090, to determine if the PASS(ID) is the last entry, PASS_END. If not, the next one is incremented with logic returning to the sequence start.

A negative response to Test 1040 shifts logic to block 1050 wherein the new entry is parsed; the Aggressor is then given the opportunity to take the new size within the trade at Test 1060. If accepted, logic branches to Block 1080 and to the Workup State. If negative, logic is shifted to the Workdown State, Block 1070.

These principles are delineated in the following sequence of screen displays in QUAD 5A below, wherein CUST 3001, 3002 and 3003 are showing

5mm, 1mm and 1mm, respectively. Just prior to the sell order by CUST 3007 (HIT ALL), CUST 3004 enters with a 1mm size. All size transacts, except this late 1.0 mm as it had not "aged" sufficiently - as measured by system interval timer. This amount remains untraded and the system enters the Second Look State.

QUAD 5A

>7.625 225		TZ		Refno 68115	
108.04		HIT		7	
0					
<u>Cust</u>	<u>Buy</u>	<u>BOT</u>	<u>Cust</u>	<u>Sell</u>	<u>SOLD</u>
3001	0	5	3007	0	7
3002	0	1			
3003	0	1			
3004	1	0			
TOTL	1	7		0	7

If CUST 3007 decides to fill this outstanding 1.0 mm size, the state moves out of "Second Look" and into the Workup State with CUST 3007 and CUST 3001 as Current Workers.

QUAD 5B

>7.625 225		TZ		Refno 68115	
108.04		HIT		8	
0					
<u>Cust</u>	<u>Buy</u>	<u>BOT</u>	<u>Cust</u>	<u>Sell</u>	<u>SOLD</u>
3001	0	5	3007	2	8
3002	0	1			
3003	0	1			
3004	0	1			
TOTL	0	8		2	8

If, however, CUST 3007 passes, the trade goes to the Workdown State. New CUST 3005 is positioned below the line and can only trade after CUST 3001 is done and CUST 3004 trades.

QUAD 5C

>7.625 225			TZ	Refno 68117	
108.04	HIT	7			0
Cust	Buy	BOT	Cust	Sell	SOLD
3001	0	5	3007	0	7
3002	0	1			
3003	0	1			
3004	1	0			
3005	1	0			
TOTL	1	7		0	7

The final state for trading logic is known as the Workdown State and it occurs when the original Aggressor takes less than all of the size showing on the passive side. The remaining size must be worked down to complete the trade. This is to reward those customers that show bids/offers, their intent to buy/sell, and thus provide liquidity in the market. If the original Aggressor returns for the remaining size on the passive size, the Workup State is initiated. Another trader from the active side may "Workdown" the remaining passive side quantity and the trade will go to the Workup State - with this new trader as the current worker - if all the remaining size from the original Bid/Offer State is taken.

The Workdown State allows new Aggressors to complete the uncleared bids on the passive side with logic conforming to the flowchart of Fig. 10. In this process, the Trading command, CMD(I), is entered at block 1210. At Test 1220, the system confirms that the trade is for less than the total passive side, TOTL. If not, logic branches to block 1280 and is directed to the Workup State.

A positive response to Test 1220 passes logic to block 1230 wherein the system opens trading to new Aggressors, to complete the pending passive side volume. However, no new passive side entries are permitted, block 1240, for the trade duration. Test 1250 confirms the last trade via timer Test 1260; if

either results in a "Yes", Workdown is terminated and the process returns to the Bid/Offer State.

Importantly, new traders presenting on the passive side must wait until all the remaining original size is worked down - and their position is held below the line. This is depicted in the following screens.

QUAD 6A

>7.625 225			TZ			
108.04			15	+108.04+		25
Cust	Bid	BOT	Cust	Offer	SOLD	
3001	5	0	3007	25	0	
3002	10	0				
TOTL	15	0		25	0	

In

QUAD 6A, the Bid/Offer State is depicted with CUST 3001 showing a bid of \$5 million. As the Aggressor, CUST 3001 lifts an offer from CUST 3007, but for only 5mm of CUST 3007 showing of 25 mm; leaving \$20 million on the passive side. See QUAD 6B.

QUAD 6B

>7.625 225			TZ	Refno 68118		
108.04			11	108.04+ TAK		5
Cust	Buy	BOT	Cust	Sell	SOLD	
*3001	0	5	3007	20	5	
TOTL	0	5		20	5	

At this juncture, if CUST 3006 enters with \$10 million offer, it must wait until the original passive side clears; CUST 3006 is thus kept below line as the remaining size is worked down. See QUAD 6C.

QUAD 6C

>7.625 225			TZ	Refno 68118		
108.04			11	108.04+ TAK		5
<u>Cust</u>	<u>Buy</u>	<u>BOT</u>	<u>Cust</u>	<u>Sell</u>	<u>SOLD</u>	
*3001	0	5	3007	20	5	
			3006	10	0	
TOTL	0	5		20	5	

A trade is cleared when that price point engenders no further buyers or sellers. A "clear" button will resurrect a new Bid/Offer State, retaining original makers size from the active side - unless superceded, and remaining untraded size from the passive side.

The logic associated with the five states discussed herein is summarized in tabular form in Fig. 11. The foregoing system design has resulted in a dramatic increase in efficiency and reduction in order errors on the trading floor.

The often frenetic environment of trading, and the entry of commands on the preferred dedicated keypad shown in Fig. 3, and the human factor of customers changing their minds all contribute to the possibility that a trade has been made in error. More particularly, errors can arise due to incorrect entries into the system, a miscommunication between a broker and trader, and the like. These errors can often force a "principal" broker into an unintended position during a trade.

This invention preferably provides ways for the broker to effectively "undo" a trade, either by cancelling a pending order, or rolling-back executions during a trade state. As shown in Fig. 3, the keypad provides CANCEL, DONE, and UNDO keys to facilitate this process. The function of these keys when the system is in a particular state is described below, it being understood that the names given to these keys are arbitrary and any input means can be used to affect the desired action(s).

In the Bid-Offer State, CANCEL functions to remove a maker's existing markets from one or more instruments in this one command stroke.

In the When State, CANCEL functions to remove a maker's markets only if there are no pending active BUY or SELL orders against it. Also, DONE functions to remove a potential aggressor, as well as trade participants, from trading lists before orders are matched.

5 During the Workdown State, CANCEL functions to remove any remaining passive maker's markets. DONE performs the same function as the CANCEL function and also allows ne passive trade participant in the Workdown State to remove themselves from trading lists, thereby effectively removing their committed sizes before the system has had a chance to execute them. UNDO
10 functions to "unroll" the trade and reduce the size shown to customers if executed during a predefined time period after the initial trade. Additionally, the UNDO function proportionally reduces the amount traded by all passive makers. The restriction of a predefined time period discourages one player from taking unfair advantage of this correction facility. Analogously, if more than
15 one trader participated in the trade, then the UNDO function causes the trader to join the contra side for the size desired to be undone. The UNDO function can be invoked at any time by any participant, on the active side or the passive side; the system uses appropriate logic to maintain the fairness of the trading protocol.

20 During the Workup State, a trader can use the DONE function to remove him/herself from being a participant from the active side or the passive side, or both sides simultaneously, regardless of the size traded or solicited. Thus, the DONE function logically removes the trader from the trade. The UNDO function can also roll back the trade provided that the first active trader has executed this function with a predefined time period following the trade. If the
25 UNDO function is not invoked during this predefined time period, or the trader is not the first active trader, then the trader is entered in the queue to buy or sell on the contra side immediately. Preferably, the trader is placed at the top of the list so that the UNDO function can be effectively invoked immediately, provided there is a contra trader. Most preferably, the rights of the first active and
30 passive traders will be maintained to assure fairness.

Although the invention has been described in detail for the purpose of illustration, it is to be understood that such detail is solely for that purpose and that variations can be made therein by those skilled in the art without departing from the spirit and scope of the invention except as it may be limited by the claims.

What is claimed is:

1 1. In combination in a data processing system for implementing a
2 structured trading environment for transacting the purchase and sale of select
3 items having a predetermined set of characteristics wherein said data processing
4 system is operated by a plurality of brokers representing one or more customers
5 of said items and said brokers are bringing together said customers into a
6 specific communication platform to permit exchanging positions regarding offers
7 and bids relating to said items, comprising:

8 a plurality of workstations comprising a display means for presenting to a
9 broker or trader information about pending market conditions as they relate to
10 said items being traded and the select positions taken by participating customers
11 in regard to said items;

12 a central server, linked to said workstations by a communication means
13 and programmed to support a predetermined trading control logic wherein said
14 trading control logic comprises a protocol of trade sequences directed to
15 implement trading commands from said customers in a predefined way
16 corresponding to the development of a plurality of trade specific states defining
17 the ability of various traders to participate in said trading activity; and

18 a communication means for distributing market information to said
19 plurality of workstations in accordance with said trading control logic.

1 2. The trading system of claim 1 wherein said protocol is defined by
2 a stored program comprising a logic structure that defines conditions where a
3 customer becomes a trader and conditions where other customers may
4 participate in a trade.

1 3. The trading system of claim 1 wherein said trading commands
2 comprise bids, offers, hits and lifts.

1 4. The trading system of claim 1 wherein said trading states is
2 comprised of a Bid/Offer State and a Workup State.

1 5. The trading system of claim 1 wherein said trading states further
2 comprise a When State.

1 6. The trading system of claim 1 wherein said trading states further
2 comprises a Second Look State.

1 7. The trading system of claim 1 wherein said trading state further
2 comprise a Workdown State.

1 8. The trading system of claim 1 wherein said display provides a
2 presentation of a bid side and an offer side of a market.

1 9. The trading system of claim 8 wherein said display further
2 provides information as to the size of uncleared bids and/or offers.

1 10. The trading system of claim 8 wherein said display further
2 provides a queue of customers organized in groups corresponding to their
3 respective participation on the bid or offer side of the market.

1 11. The trading system of claim 10 wherein said customer queue is
2 ordered by time of entry.

1 12. The trading system of claim 11 wherein said queue order is further
2 based on quality of entry in terms of price.

1 13. The trading system of claim 12 wherein said display provides
2 information regarding the entry of a hit or lift by a trader.

1 14. A computer trading system for use by multiple traders wherein
2 each trader operates a custom designed keypad for data entry and receives
3 information about market conditions from a display comprising:

4 a data processor with associated data storage for providing a trading
5 protocol that establishes trading hierarchy among participants;

6 a trade command input means including said custom designed keypad
7 wherein said keypad includes a plurality of trade execute keys, individually
8 assigned to a particular security available for trading, said keypad further
9 comprises a plurality of customer entry keys assigning trade commands to a
10 particular customer;

11 a display means for presenting a trading information profile wherein said
12 trading profile includes pending offers and bids at select price points and size.

1 15. The trading system of claim 14 wherein said input means provides
2 single keystroke entry for trade cancel command.

1 16. The trading system of claim 14 wherein said data processor
2 provides for a Bid/Offer State wherein customers' price and size are displayed
3 on said display means.

1 17. The trading system of claim 16 wherein said Bid/Offer State is
2 terminated by a customer entry of a hit or lift command.

1 18. The trading system of claim 16 wherein said Bid/Offer State is
2 moved to a "When" State by a new customer entry of a hit or lift.

1 19. The trading system of claim 14 wherein said display means
2 presents information on trade transactions and customer access contingent on
3 system trading state.

1 20. A method of financial instrument trading implemented on a
2 distributed workstation computer system, wherein said system provides for a
3 predetermined trading protocol delineating trader access comprising the steps of:

4 a. providing a Bid/Offer System State wherein customers participate
5 by entry bids, offers, price and volume information;

6 b. distributing said information to said plural workstations in
7 essentially real time;

8 c. receiving hits and/or lifts from said customers responding to
9 pending bids/offers as displayed on said workstations;

10 d. entering a Trading State wherein transactions are completed at a
11 single price;

12 e. returning to the Bid/Offer State after a pre-established termination
13 event in said Trading State;

14 f. tracking and outputting consummated trades from said Trading
15 State.

1 21. The method of claim 20 wherein said Trading State is further
2 delineated into a Workdown and a Workup State.

1 22. The method of claim 21 wherein said Workup State is created by a
2 single customer hitting or lifting all pending size.

1 23. The method of claim 22 wherein said Workdown State is created
2 by a customer hitting or lifting less than all of said pending size.

1 24. The method of claim 20 wherein said trading protocol is encoded
2 in programming logic controlling said computer system.

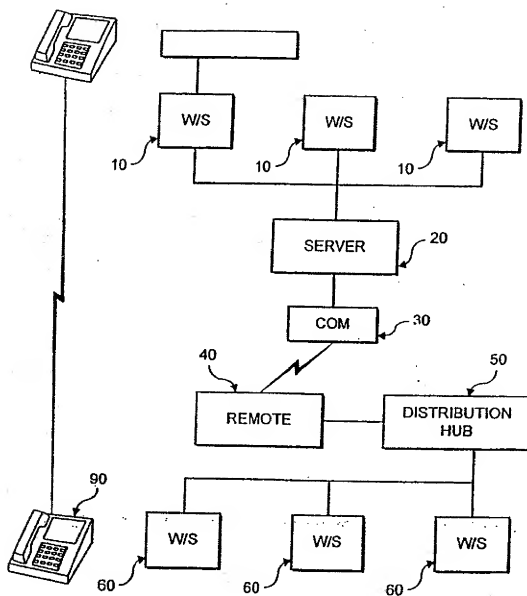
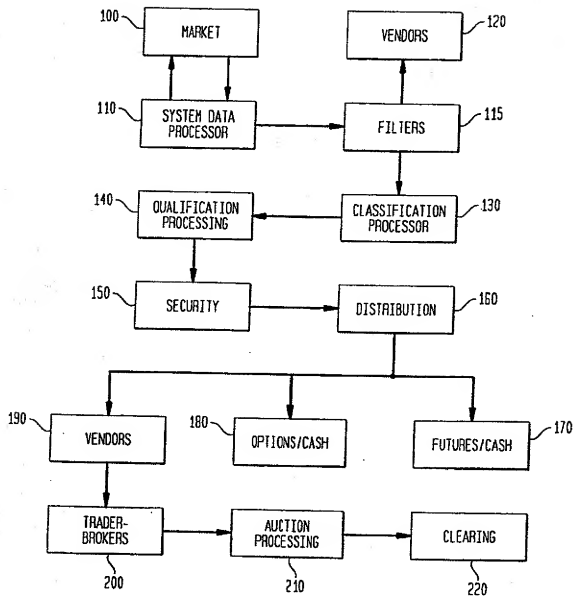


FIG. 1

FIG. 2



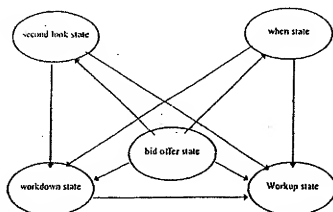


FIG. 4

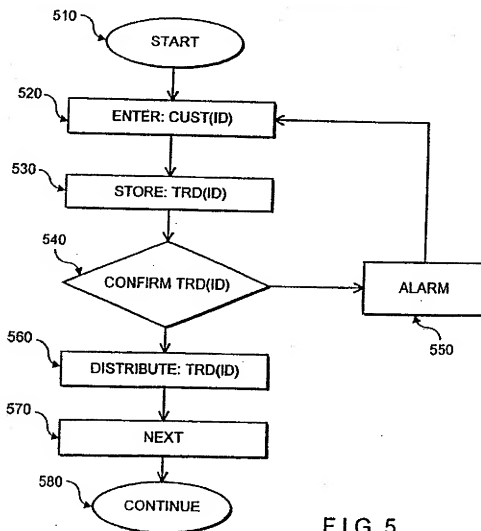


FIG. 5

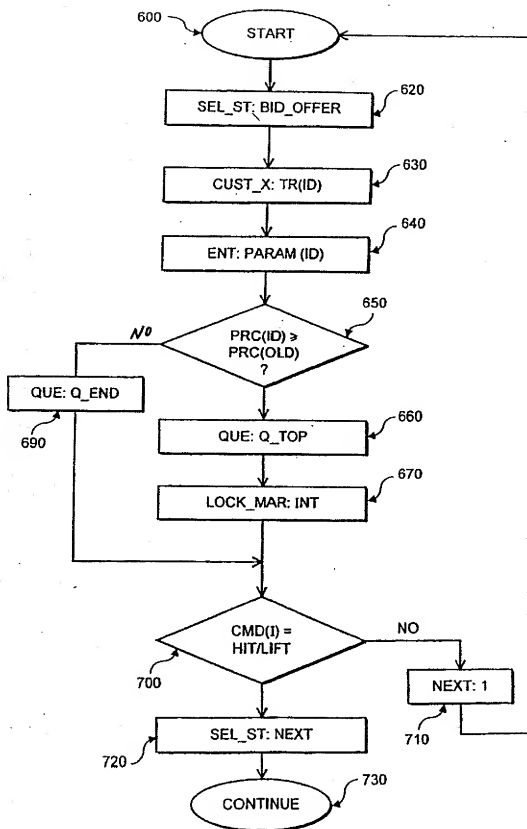


FIG. 6

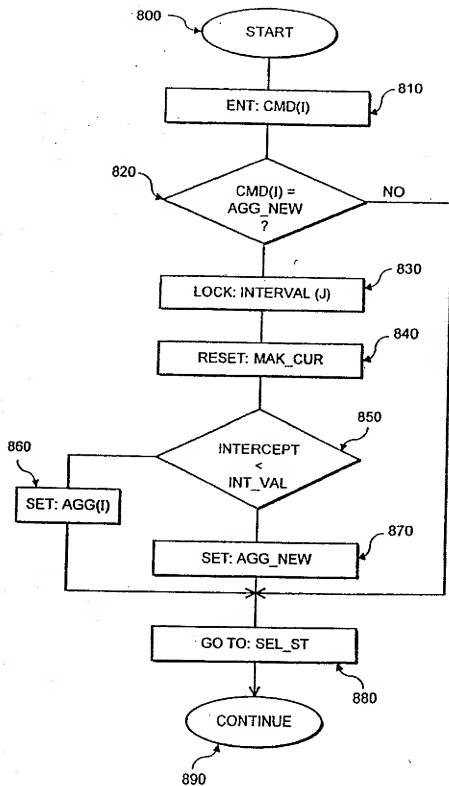


FIG. 7

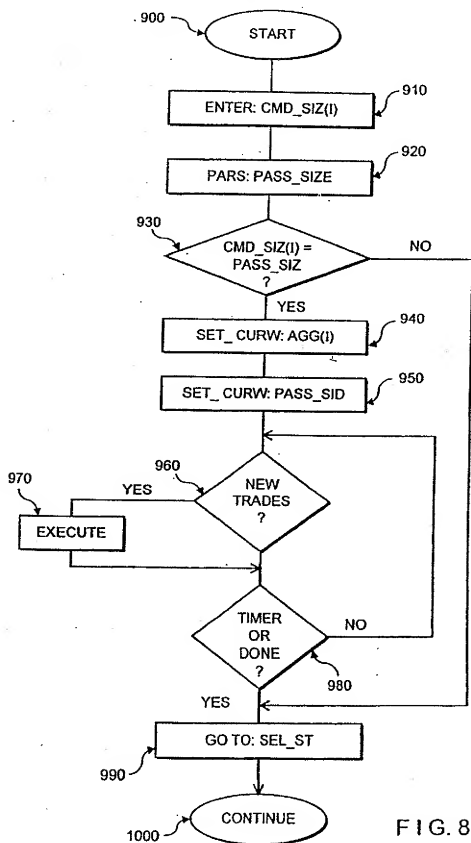


FIG. 8

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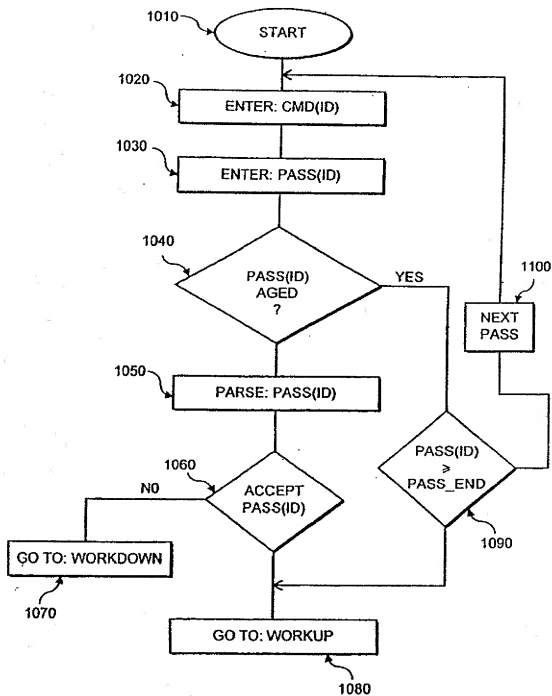


FIG. 9

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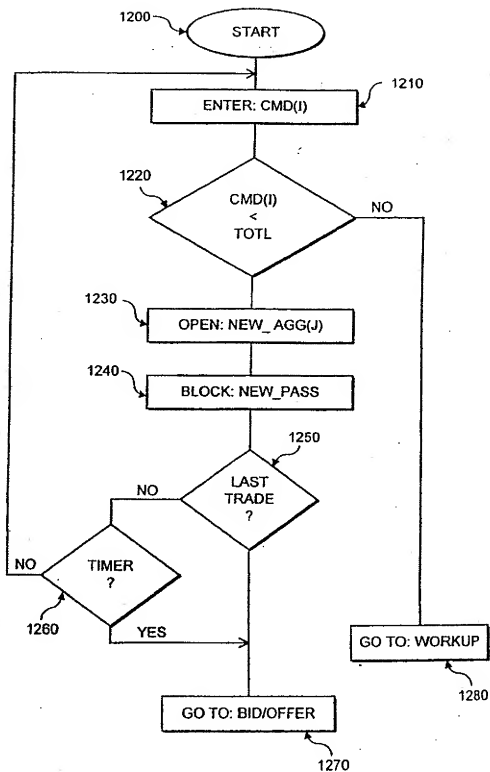
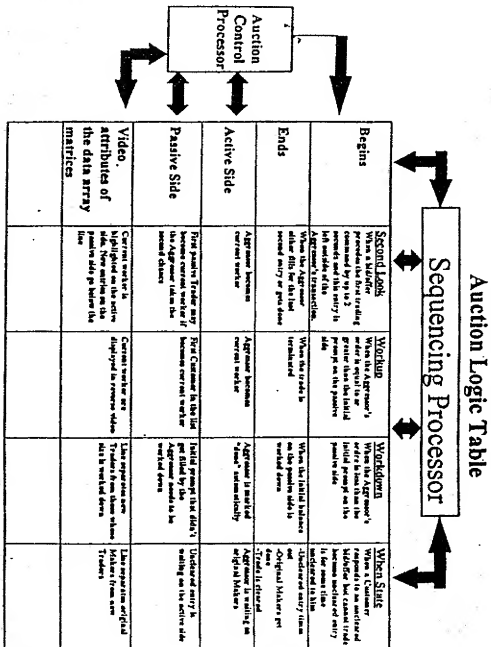


FIG. 10

Figure 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/22423

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G06F 17/60

US CL : 705/37

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/37,39

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,E	US 5,717,989 A (TOZZOLI et al.) 10 February 1998, col. 3, line 33 - col. 4, line 32.	1-24
Y	US 5,375,055 A (TOGHER et al.) 20 December 1994, col. 2, line 14 - col. 4, line 49.	1-24
Y	US 5,297,032 A (TROJAN et al.) 22 March 1994, col. 4, line 52 - col. 6, line 14 and col. 6, line 15 - col. 11, line 57.	1-24
Y	US 5,297,031 A (GUTTERMAN et al.) 22 March 1994, col. 7, line 19 - col. 15, line 6.	1-24
A	US 5,305,200 A (HARTHEIMER et al.) 19 April 1994, col. 2, line 45 - col. 4 line 5	1-24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later documents published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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L document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A* document in member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

01 MARCH 1998

Date of mailing of the international search report

26 MAR 1998

Name and mailing address of the ISA/US

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